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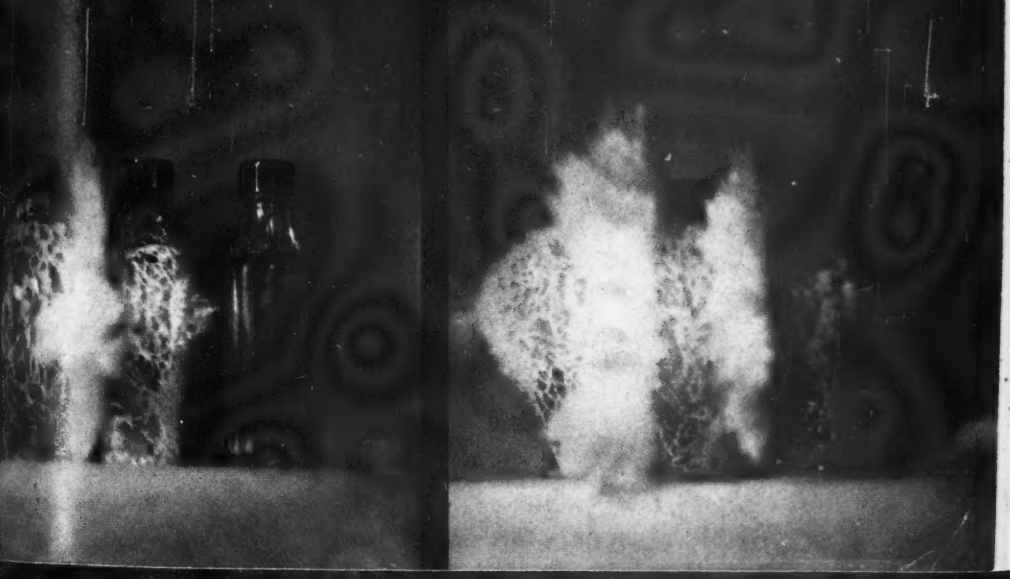

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special features

Deathtrap, U. S. A. 59
By Roger Dunham

How To Become A Millionaire 62
By Lester David

This Month's Prize Gadget—Kiddie Korral 65

Atomic Duster . . . Deadliest Weapon . . . 66
By Frank Tinsley

"I Made It Myself" 70

They Bring Down The House 72
By Irene Neer

New In Science 75

New Toys For Xmas 76

Fly-In Theater 78

Camera Stops Bullet—In Color 80
By David Robbins

Surgery With A Paint Brush 82
By Don Romero

Shuffling Freight Cars By Radio 84

New On The Road 85

Money-Making Idea—I Jazz Up Old Pianos 86
By Charles C. Nields

MI Tests The Kaiser-Frazer Cars 88

Meet The Hillman Minx 90
By Tom McCahill

Hobby Hall of Fame—Carl Sandberg .. 93

Editor's Workbench 12

Invention Clinic 24

(continued on page 10)

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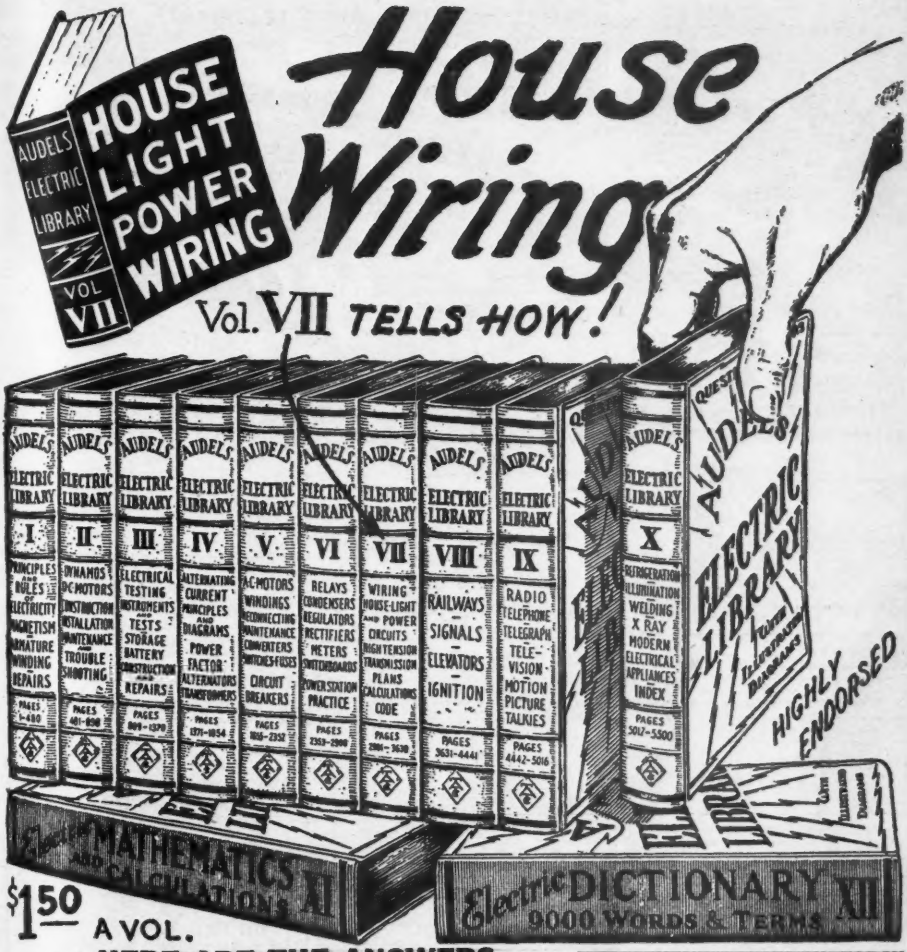

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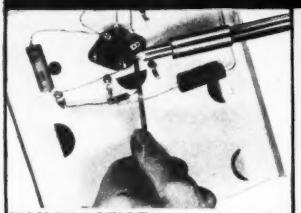

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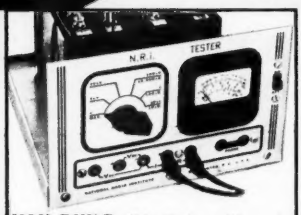

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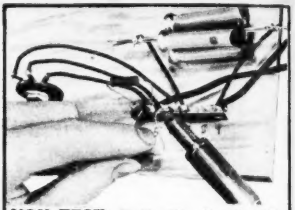

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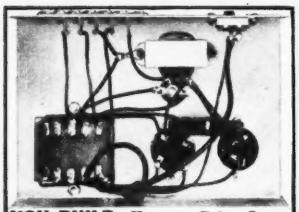
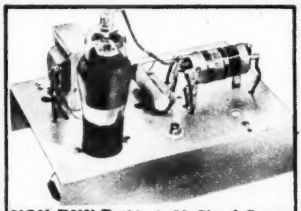


YOU BUILD Vacuum Tube Power Pack; make changes which give you experience with packs of many kinds. Learn how to correct Power Pack troubles.



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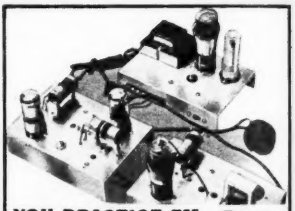

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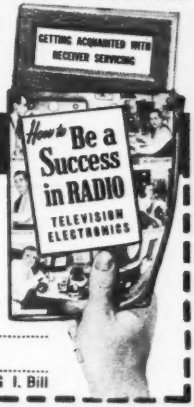

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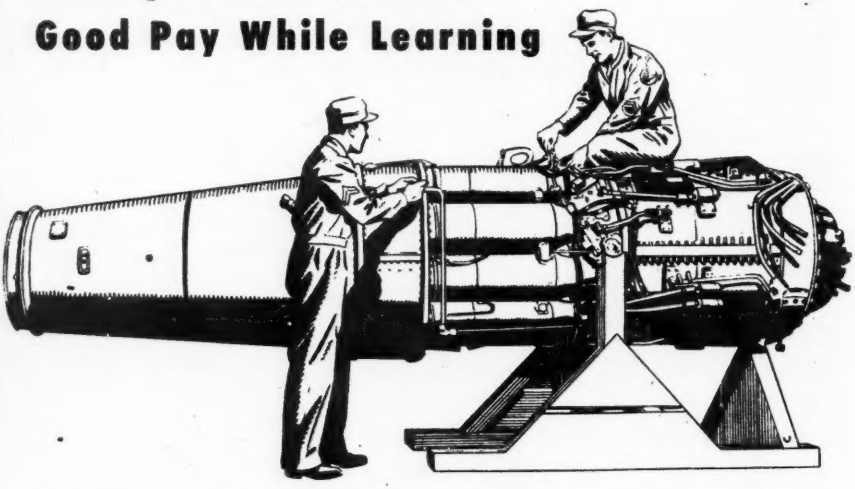

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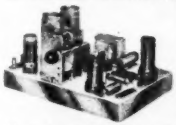

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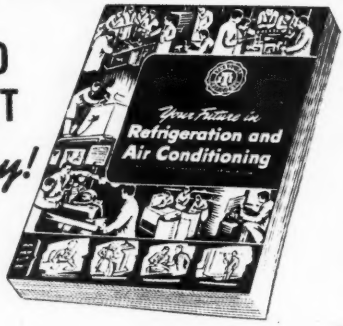

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crafts and hobbies contents

Continued from page 2

Christmas Candy Tray 95

Al Williams' Gulfhawk 96

Platform Rocker 102

Building Flying Dutchman 104

Amateur Telescope Maker's Page .. 109

Deep Freezer Part II 110

Tooled Leather Brief Case 114

Panel Your Walls With Plywood .. 116

Car Care 120

Behind the Wheel 121

Some Hot Tips on Soldering 122

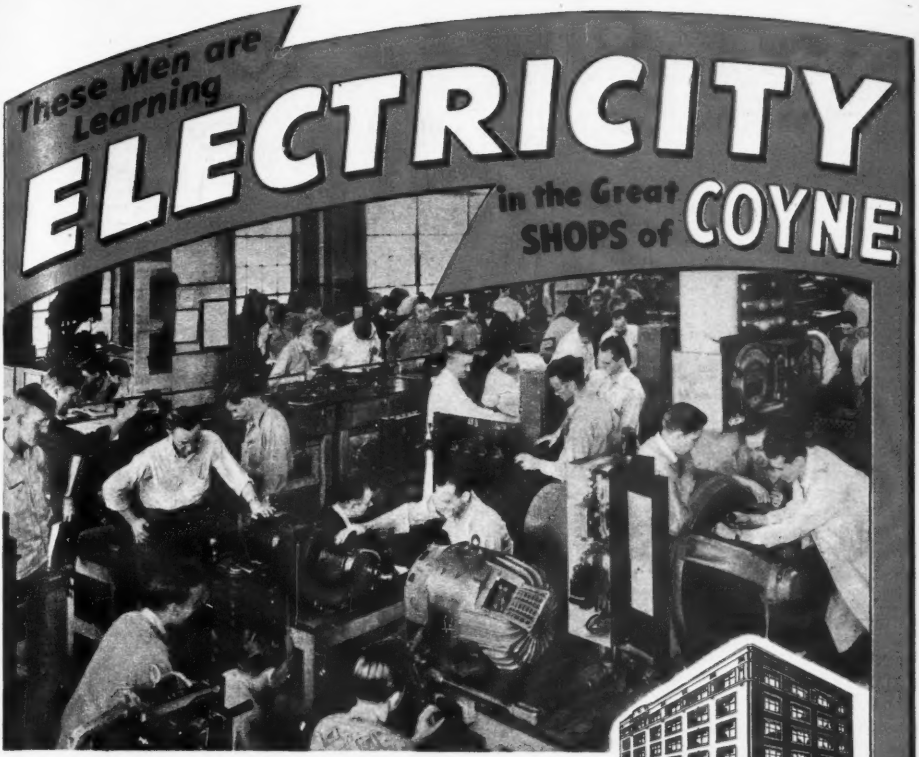
Monthly Photo Contest 124

Ferrotyping 125

Personal Xmas Cards 126

Photo Shorts 129

Bike Rack 131



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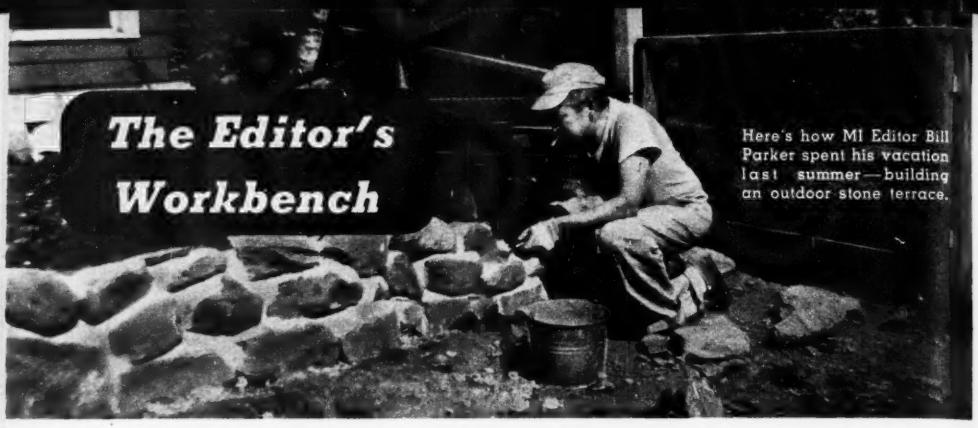

Here's how MI Editor Bill Parker spent his vacation last summer—building an outdoor stone terrace.

Calling All Radio Hams

Dear Editor:

I was reading your December, 1947, issue and what caught my eye was the article, *Two-Way Amplifier,* by Tracy Diers. So I familiarized myself with it and decided to build it.

The article stated that if wired according to the diagram, it would work and keep on working, with no bugs to be ironed out.

(At this point, reading the letter, our Crafts and Hobbies Editor, Larry Eisinger, took a deep breath and said to himself, "Oh, oh! Here it comes—he did find bugs." But read on. . . . Editor)

So that is just what happened. I think it's wonderful. I gladly recommend this versatile, economical little amplifier to anyone who wants fun as well as good experience building one.

Charles F. Rea,
144 South Soto St.
Los Angeles 33, Cal.

Thanks a lot, Charlie. You had us worried for a moment. But we're doubly glad you wrote us because your letter, typical of many we get every day from radio fans, makes a very nice introduction to an announcement we know will interest you and thousands of others. Because of MI readers' terrific interest in radio and television, we are inaugurating with this issue a regular, monthly radio department.

Conducted by Robert Hertzberg, former executive editor of this magazine and one of America's pioneer amateur operators, the new column will discuss all phases of radio and electronics in language the layman can understand. Bob's first article, on pages 122-123, deals with that all-important subject, soldering. It's packed with information that will be extremely useful to you in assembling radio kits, repairing wiring and doing other work requiring the use of a soldering iron. Future articles will deal with similar subjects of major importance to the radio amateur. Bob will also answer letters from readers who want information about specific problems.

Book Notes

SMALL BOAT ENGINE MANUAL by C. Morgan Jones, published by Cornell Maritime Press, 276 pp., $4.00.

This is a practical workbook for boat owners, written in a simple, interesting style. It covers engine selection, installation, operation and maintenance—all amply illustrated. The author devotes the final section to trouble-shooting—how to recognize symptoms and make repairs on all types of gasoline and Diesel engines commonly used in pleasure craft and small fishing boats. This section may save you many times the price of the book in repair costs.

MAKING YOUR OWN TELESCOPE by Allyn J. Thompson, published by Sky Publishing Corp., 211 pp., $3.50.

Readers who constructed MI's portable telescope will find this book a good source for background material. Mr. Thompson goes into the history of the telescope from Galileo's time to the present. Most of the book is taken up with telescope-making as practiced by today's amateurs.

This is a good time, too, to announce that the tenth edition of our popular manual, How To Build It, *is now on sale at your favorite newsstand. Priced at 60c, it contains 144 pages of readable, easy-to-follow instructions for building a variety of projects ranging from a child's sled to a backyard swimming pool, plus a lot of other information for the home craftsman.*

[*Continued on page* 14]

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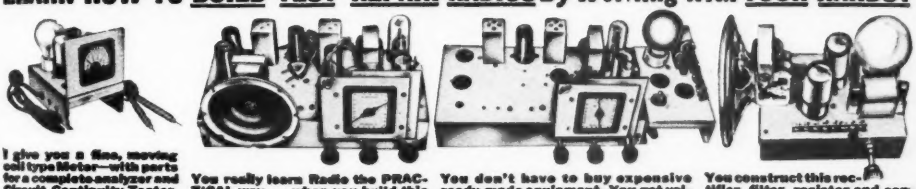

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Editor's Workbench

[*Continued from page* 12]

● *How the Word "Kodak" Originated*

Many people have often wondered how the word "Kodak" ever came into being. Has it got some particular significance? Does it compile the syllables of certain products? Does it stand for the inventor's name? In other words, just what does it mean? Gather 'round, here is the real low down:

Back in June, 1888, George Eastman of the you-know-what company was trying to devise some word with which his product (a camera—Ed.) could be identified. He wanted a word that could be easily spelled and readily pronounced in any language. "The letter 'K' had been a favorite with me," he said later. "It seemed a strong, incisive sort of letter. Therefore, the word I wanted had to start with 'K.' Then, it became a question of trying out a great combination of letters that made words starting and ending with 'K.' The word Kodak is the result."

And now will someone tell us what the letters B.V.D. stand for?

● *Letter From an Ex-POW*

Dear Editor:

As a prisoner of war in Canada I had the chance to read MECHANIX ILLUSTRATED and I always liked the articles it contained. Although I speak little English, I picked up a good reading knowledge of your language. As your magazine could not be obtained by regular means during my stay in Canada, I had to barter with cigarettes or handycraft on the black market (some kind and understanding Canadian soldier on guard duty) and I value very highly the copies I could take with me to Germany.

I live with hundreds of others in a refugee camp in Germany and I work as a mechanic in the Volks Wagen Werk (Peoples' Car factory). In conversations and discussions with friends and workmen-members of our trade union, your magazine gives me not only the facts and views of the modern world but many articles of the daily life in democracy.

As it is impossible to get here one copy of your or any foreign magazine, I am therefore taking the liberty of asking you to supply me with some old copies as those never lose their value. Perhaps could it be arranged through the generosity of one of your readers?

Hans Schlegner
(20b) Wolfsburg
E—Lager 13/3, Germany

[*Continued on page* 18]

INVENTORS

Patent laws encourage the development of inventions.

We recommend that an inventor employ a registered Patent Attorney or agent, if the inventor is not familiar with patent matters. This is because the value of a patent depends largely upon the skillful preparation of the specification and claims in the patent application.

The firm of McMorrow, Berman and Davidson is registered to practice before the United States Patent Office. Additionally it engages patent attorneys able to readily understand inventors' disclosures, to advise concerning patentability, and to prepare appropriate specifications and claims.

If an inventor believes he has an invention, a search of the most pertinent prior U. S. patents should be made and a report obtained relative to its patentability. Where such report indicates that the invention appears patentable, in order to secure protection, diligence should be exercised in making application for a patent.

Send for a copy of Patent Booklet entitled "How To Protect Your Invention." This booklet contains information on patent protection and procedure. You will also receive an "Invention Record" blank. This will be promptly forwarded to you upon request—no obligation.

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Editor's Workbench

[*Continued from page* 14]

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Each month in The Editor's Workbench *we publish snapshots and letters from readers who have built boats, planes, tractors, trailers, model race cars and a vast variety of other projects, either from MI-tested plans or from their own designs. To each contributor whose work is considered worthy of publication in this column, the editors of* MECHANIX ILLUSTRATED *are happy to send a check for $5.00 and a handsome* Editor's Workbench *Award certificate, testifying to the winner's skill and craftsmanship. Projects which, in the editors' opinion, just fall short of deserving a cash award, will earn their creators a Certificate of Merit.*

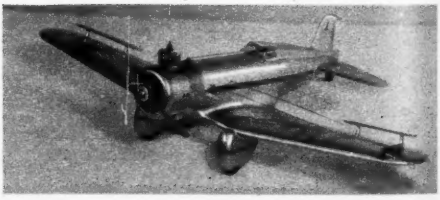
So, send us a clear, black-and-white, glossy snapshot of your workshop project, together with a letter describing how long it took you to build it, how much it cost and any other details you think might interest other MI craftsmen. Be sure to sign your full name and address (including street and number). Send your letter and pictures to Editor's Workbench, MECHANIX ILLUSTRATED, *67 West 44th Street, New York 18, N. Y.*

De Luxe Sky Chief

Dear Editor:

I am enclosing a picture of my model Sky Chief, which I based on the plans published in the March issue of MECHANIX ILLUSTRATED.

Donald Hutcheson
2938 Fourth Avenue
Council Bluffs, Iowa



That's a slick trick you've performed, Donald, in rigging up MI's Sky Chief (Plan No. 386—$.50) for two-way radio. A $5 Award is winging your way to wish you happy landing for that hot ship of yours.

[*Continued on page* 20]

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Name.....

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Editor's Workbench

[*Continued from page* 18]

$52 Flyer

Dear Editor:

Last year in our school shop a friend of mine and myself built a boat from your plans. The boat is the Flyer. Bought an issue of your fine magazine and built the boat from the plans contained therein.

We had to do a lot of improving because at that time some things were hard to get. We changed the joint on the bow to a transition seam which I believe improves the appearance of the already swell design.

Total cost was approximately $52, including hardware, finishes, etc.

We used the boat all last season. A local expert said that if we bought the boat from a commercial builder it would probably cost about $275.

My friend and I were juniors when we built the boat. His name is Herbert Hedstrom. The girl in the boat is my cousin.

Carl Anderson, Jr.
R. R. 1
Jamestown, Kan.

Glad to see you doing such a swell job, too, on our plans, Carl. We're sending you a $5 Workbench Award *to split with Herbert and make your boat (Flyer, Plan No. B142—$1) even more of a bargain. One thing you did forget, though—name of that nice-looking cousin!*

Nifty Navion

Dear Editor:

Here's a picture of my "Ohlsson 23" powered model of the North American Navion, the plans for which appeared in MECHANIX ILLUSTRATED.

R. F. Barrett
2800 Notre Dame St.
Lachine, Quebec, Can.

[*Continued on page* 22]

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Editor's Workbench

[*Continued from page 20*]

We're sure that nifty Navion (Plan No. 369 —$.50) you're holding isn't just beginner's luck, fellow. There's a $5 check going your way to show what we think of your "first attempt."

Tractor-Mower Combine

Dear Editor:

Enclosed is a photo of a garden tractor and lawn mower. It is powered by a one-hp Briggs and Stratton Motor. The drive wheels come from a 1935 Ford.

Lavern Hueske
Box 62
Plymouth, Neb.

And it's a pleasure, Lavern, to make out a $5 Workbench Award *for this ingenious homemade combine. We can see you're going to have a new path to your door—beaten out by all the neighbors crowding over to "borrow your lawn mower."*

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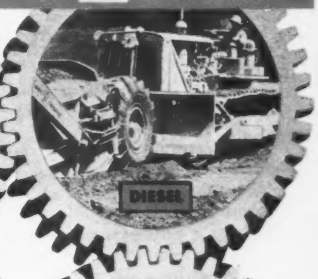

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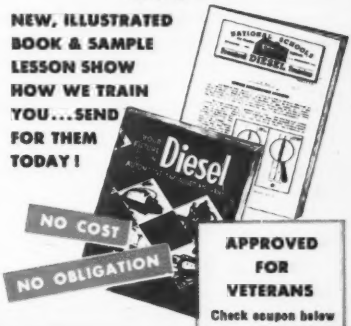

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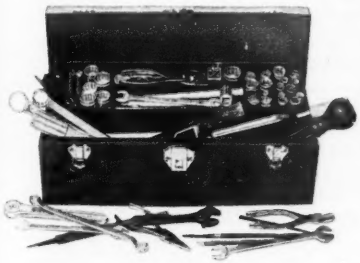

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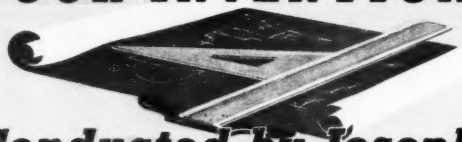
YOUR INVENTION CLINIC



Conducted by Joseph H. Kraus

To facilitate the answering of their mail, readers desiring the advice of Mr. Kraus on inventions matters are requested to observe the following simple rules: 1) Type or write clearly, on one side of the paper. 2) Make sure that your full name and address, including street number and postal zone, if any, are on the letter and all accompanying papers. 3) Mail drawings or photographs flat, not rolled, and include postage if you want them returned. 5) Do not ask questions relating to patent laws. 6) Do NOT send models.

Address your inquiries to "Your Invention Clinic," MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y. Mr. Kraus will answer as many letters as possible in this column. His services are free.

Smoker's Kit

George R. Nelson of Almelund, Minn. sends a copy of his patent application and wants information as to class of manufacturer who could make the unit.

ANSWER: We hope that you have made and tested the smoker's kit described in your pending patent and that others were as favorably impressed as you seem to be. If this article is good, it should have a substantial sale.

The unit can be made by metal-parts manufacturers. Any company manufacturing cigarette cases or compacts could make the item outlined in your specifications. But the construction and system of producing a cigarette may not work as well as you hope.

For some strange reason, home-rolled cigarettes do not seem to have the same flavor as the manufactured varieties. Even when tobacco is removed from a cigarette and rerolled into another paper, the "draw" is different—too hard or too free. We recommend that you produce several good working models and test the unit for a period of a month or more. Proof of satisfactory performance will be worthwhile. The general scheme is good enough to justify any expense but it must be made to work perfectly.

Flying Toy

J. M. Jenkins, Jr., of Wilmington, N. C. has designed an amusing toy. He says he understands such an article cannot be patented because it is neither useful nor educational.

ANSWER: The statement that an article must be useful or educational to be patentable is certainly not in keeping with the facts.

You may not be able to patent your design simply because the idea is old. We say this even though you did not describe the exact manner of its construction. Dozens of flying propellers have appeared on the market. Some use only one wooden part and a metal blade. Some are in the form of tops which start from the ground and take off. Others are on twisted wire or band spirals.

We suggest you investigate the field thoroughly, then have a search made and base your future actions on the results. If the toy is new, it stands a good chance. But it is in a rather full field in which similar articles are found in great array.

Match-Book Cover

Martin Feldman of Long Island City, N. Y. has designed a match-book cover which he claims is very satisfactory. His tests reveal no weak points in either construction or use.

ANSWER: How in the world you expect your match-book construction to compare with modern design is beyond our understanding. You were just plain lucky in your so-called tests. In your design, you almost make certain that the matches will be ignited accidentally. Your cover remains open while the matches are being struck. A flying spark may easily set off the entire strip.

Many designs for match books have been patented but manufacturers are not interested. We recommend that you forget your match book. It is as close to 100 per cent worthless as anything can be.

New-Type Flower Pot

E. W. Splittstoser of Stacy, Minn. sends a report of a search on a new type of flower pot. He wants us to tell him what to do.

ANSWER: There are a number of unfavorable factors in your design for a flower pot. First, the reeds which are used as stakes are not of uniform diameter; many are knobby at the base. This means that the reeds will not hold securely in the sockets unless dowels made by machinery are substituted for them. But the florist knows how to count his pennies and if special stakes cost two cents more per

[*Continued on page* 36]

INVENTORS

Unless an inventor is thoroughly familiar with such matters, he is advised to employ a competent registered patent attorney or agent as the value of patents depends largely upon the skillful preparation of the specification and claims.

For his guidance, the following are the usual preliminary steps which the inventor takes toward patent protection.

The "Evidence of Invention" form mentioned below is offered as a convenience to the inventor in making his disclosure of invention.

The inventor should date and sign his disclosure and have it witnessed by two or more persons who are capable of understanding his invention. The disclosure should then be mailed to the registered patent attorney or agent whom he selects to assist him. The disclosure should be accompanied by a letter authorizing the patent attorney or agent to conduct a preliminary search among previously granted U. S. patents for similar types of invention. The patent attorney or agent then prepares a report of the probable patentability of the invention and recommends the further course the inventor should take, provided the report indicates possible patentability.

This firm is registered to practice before the U. S. Patent Office and is available to assist inventors in the preparation and prosecution of their cases. The coupon below is suggested as a convenience to the inventor in starting action on his invention.

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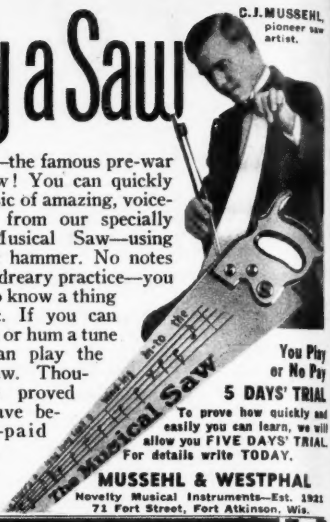

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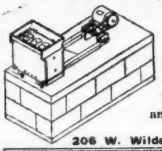

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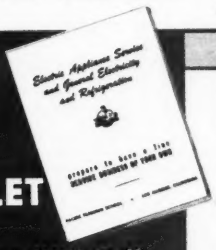

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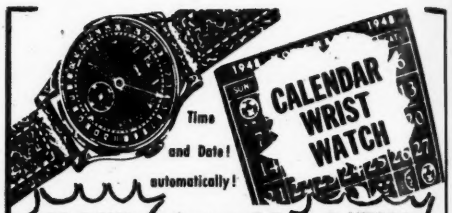

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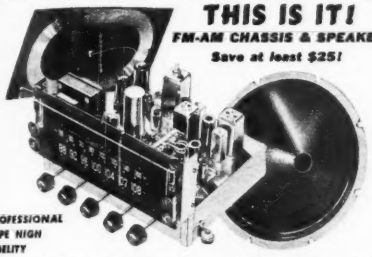

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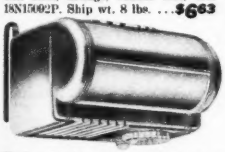

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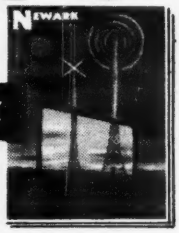

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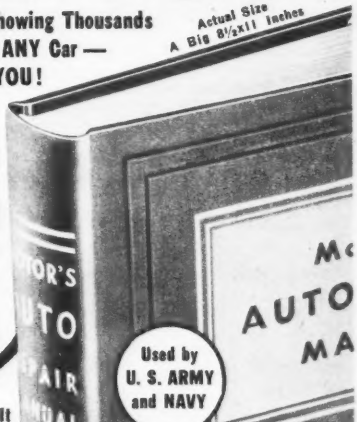

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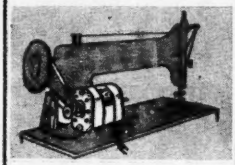

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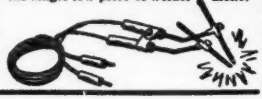

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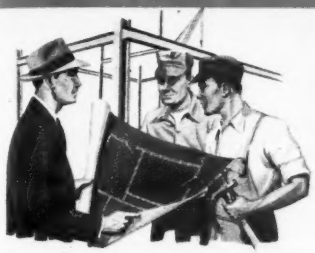

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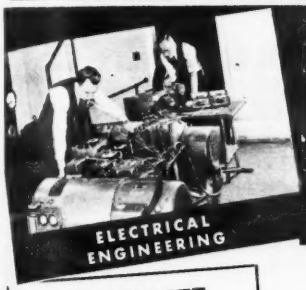
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[*Continued from page* 24]

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[*Continued on page* 39]

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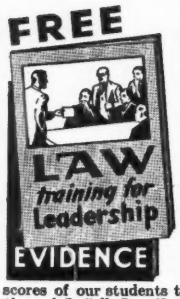

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Your Invention Clinic

[Continued from page 36]

Carbon Eliminator

Irving Weiss of Los Angeles, Cal. says he has produced a device which is 91 per cent effective in removing carbon particles from auto-exhaust fumes. He holds that his gadget should be valuable.

ANSWER: Nearly every thing which burns in air gives off carbon particles. The auto contributes little, if anything, to the smog about which you write.

Carbon dioxide is valuable. Green plants cannot live without it. You exhale it from your lungs with every breath, so it is not as harmful as you believe it to be. Carbon monoxide is another gas found in auto exhausts; this is harmful. It is the result of incomplete combustion and is deadly in sufficient quantity.

In our opinion you are barking up the wrong tree. There is not a chance in a million that your carbon eliminator will be looked upon favorably.

Temperature-Controlled Faucet

Lester D. Kelner of Philadelphia, Pa. asks about a mixing valve on which he is working.

ANSWER: Before you continue with your design you should examine some of the products now available. The biggest problem here is to control absolutely the temperature regardless of the volume of water. Most thermostats cannot operate quickly enough to regulate the supply of hot water when the volume of cold water is cut by opening another faucet in the line.

In our opinion, the design of your valves is not good. There is a tendency to shut at the wrong times. If this should happen suddenly on a cold-water line, a person using the shower is likely to be scalded.

We could suggest the name "Faultless" provided that this could be applied truthfully. However, we wish inventors would stop worrying about names and pay more attention to technical details. A name never sold anything until after the reputation for the product or the qualifications of the manufacturer were established.

Proper mixing of various temperatures of water has been a problem for years and much thought has been given to the subject. Although one manufacturer claims to have the perfect article, we still feel something simpler and easier to install would meet with a good sale. And a simple, quick-acting thermostatic control for steam heaters also would sell well.

[Continued on page 41]

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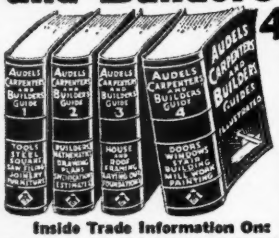

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Your Invention Clinic

[Continued from page 39]

Invisible-Ink Glasses

Garconio Castor of Manila, Philippine Islands says that he has made colored glasses with which he can read invisible-ink markings. He wants to know if similar devices are on the market and if there would be a demand for such articles.

ANSWER: Tinted glasses for reading certain kinds of so-called invisible ink have been available for years. But these will not work with all kinds of invisible inks. They are supplied by dealers of equipment for gambling houses and generally are used with marked cards to give the gambler an unfair advantage. We feel that we should not reveal the address of a supply house.

Unless a practical purpose can be developed for the use of the glasses and the inks used with them, we can see no purpose in pursuing the investigation.

cable for fire escape

John L. Holley of Waco, Texas, has a patent pending on a drum-and-cable fire escape. He wants to know what we think of the patent.

ANSWER: For more than 80 years inventors have been patenting devices to rescue people from burning buildings. Evidently your design seeks to do the same thing in a more complicated way, with a hydraulic system providing the brake.

But older devices that once were protected but are now public property do the same trick—and do it much more simply. Some of these devices were rigged up so that the carrier returned for another fire victim immediately after lowering the first one to safety. Several of the models had tension devices set so that the weight of the passenger automatically controlled the speed of descent. Special releases allowed extra speed in case of sudden danger from sweeping flames.

Your cable fire escape is more complicated, more expensive and more unsightly than many of these early models. Instead of releasing your cable directly from the carrier drum, you have to play the cable from inside the house. Naturally, then, your cable would wear out faster than those in the other models. Wear is not one of the biggest factors in an escape cable, since it will rarely be used more than once or twice at any location. But servicing and costs are important.

We doubt that there's enough future for your cable fire escape to warrant spending a lot of money on it.

[Continued on page 43]

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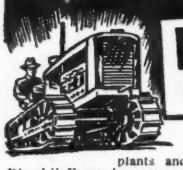

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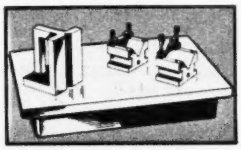

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Your Invention Clinic

[Continued from page 41]

brush for dental plates

M. L. Fitzpatrick of Storm Lake, Iowa, sends a design for a dental-plate brush that you can rotate with one finger. He says it works quicker and better than a regular brush.

ANSWER: We don't see how your dental brush can do either a quicker or better job than any other brush. The brush's abrasive work depends upon how much energy you apply to the brush, if all other factors are the same. It's impossible then to expect your one-finger brush to give the same amount of friction that you can get by using two fingers or the whole hand to work a conventional brush. You may increase the speed of rotation with your brush but you also decrease proportionately the pressure you can apply to the bristles.

If you exploit your novelty well enough, figure out a good way to clean the brush after use and arrange some system to keep the plate cleanser from spattering in every direction, you may be able to develop a small sale. But there are too many "ifs" here for us. Nobody likes to advertise the fact that he has to use false teeth, in any case. We feel sure that most people would prefer using a conventional brush and simply discarding it when it gets worn. So, we suggest you let this idea drop and start to work on some other problem.

Theater-Projection System

M. Lopez of New York, N. Y. asks some questions about a theater and projection system. He also wants to know if he can patent a system before making a model.

ANSWER: Your first step should be to make an understandable sketch. Submit this to your attorney and request that a search be made to determine if the item seems to have the requirements of an invention. If the report is favorable, you can apply for a patent immediately. If the sketch and description are understandable to the patent examiner, no model is needed. But a model would be recommended for purposes of negotiating a sale.

By failing to describe your version you limit our ability to evaluate probabilities of success. We would not be too concerned about disruption of attendance in movie theaters by television. It will be a long time before television can replace a good movie. We hold that if your theater-projection system is as good as you claim it to be, more people will attend the theater to enjoy the show more fully. Thorough evaluation and immediate constructive action are recommended.

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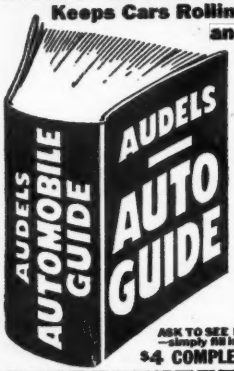

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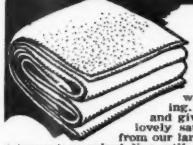

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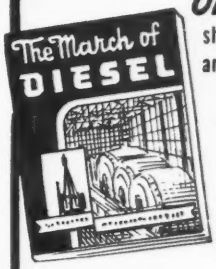

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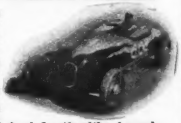

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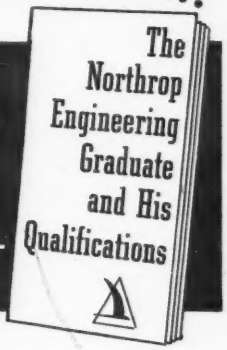

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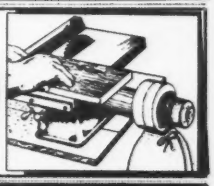

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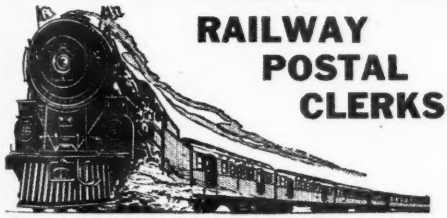

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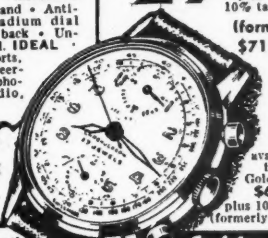

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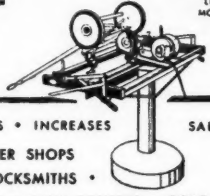

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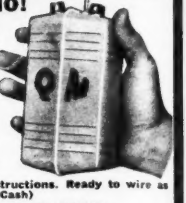

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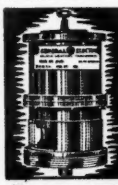

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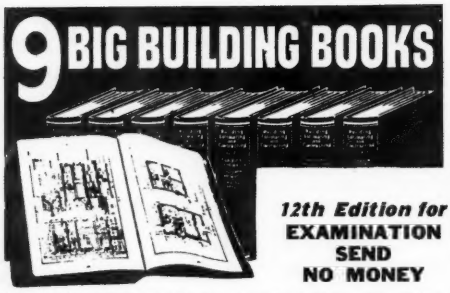

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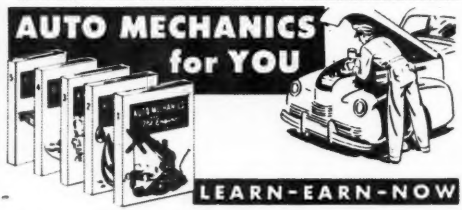

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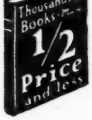

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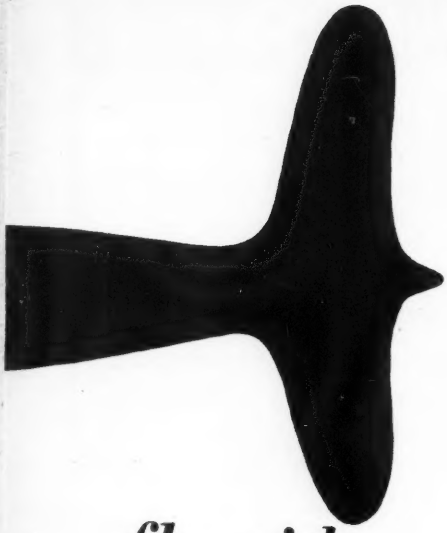

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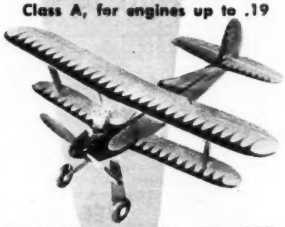

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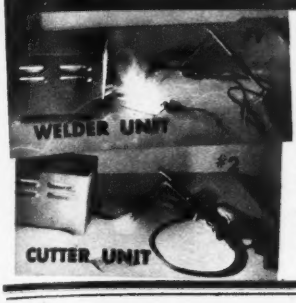

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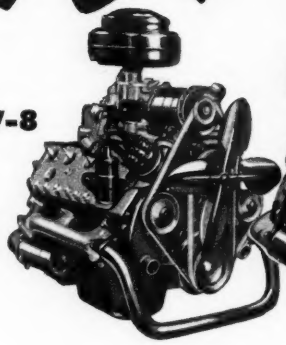
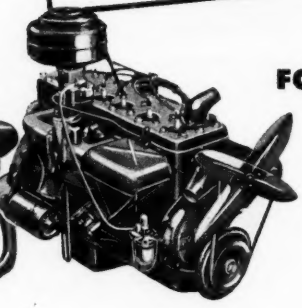
FACTS ABOUT THE '49 FORD

TWO NEW ENGINES

FORD V-8



FORD SIX



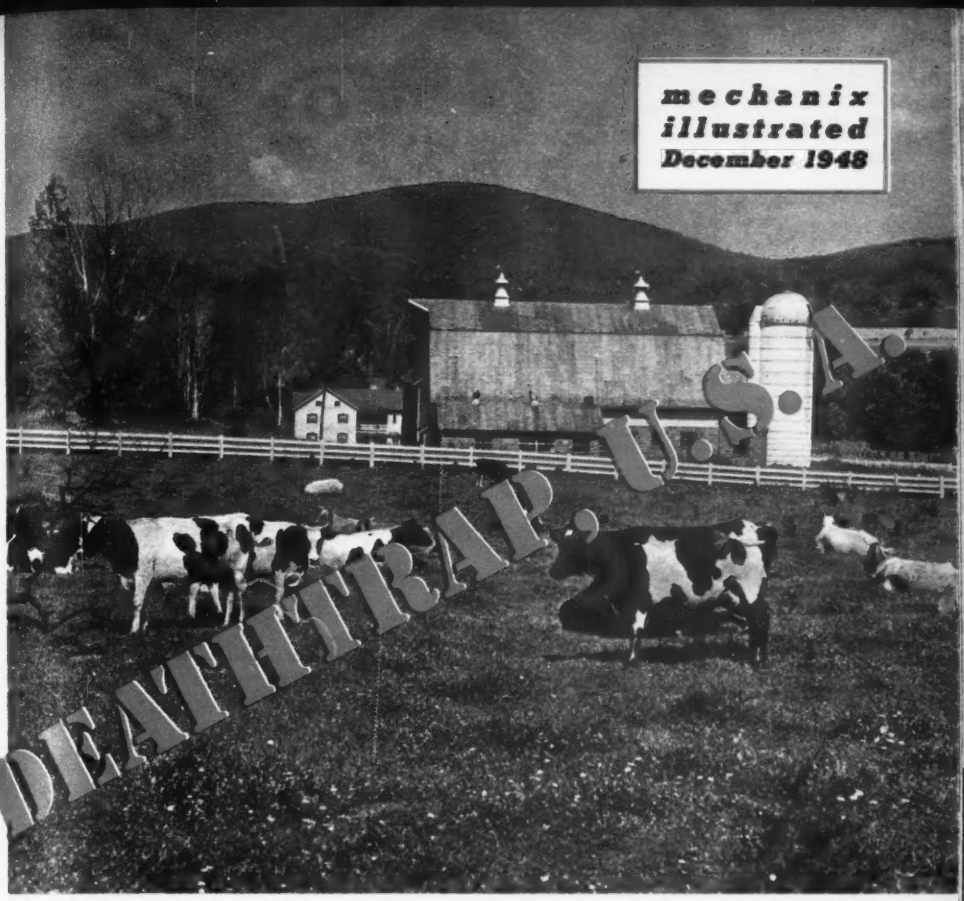
For "The Car of the Year" Ford provides a choice of two engines—a new V-8 and a new Six. Here are the basic engine specifications:

	SIX	V-8
Type	L-head	L-head, 90° "V"
Displacement, cu. in.	225.9	239.4
Bore x stroke, in.	3.3 x 4.4	3-3/16 x 3¼
Max. brake hp. at rpm.	95 at 3300	100 at 3600
SAE-AMA hp.	26.1	32.5
Compression ratio	6.8 to 1	6.8 to 1

Both V-8 and Six cylinder engines incorporate many important changes in design and construction which decrease power losses, increase engine efficiency, provide exceptional accessibility for servicing and assure longer engine life. The major changes incorporated in both engines include a new "Equa-Flo" Cooling System with balanced type thermostat and pressure type radiator cap; greatly improved lubrication system; new combustion chamber contours; redesigned intake manifolding; unique vacuum differential spark advance regulation; new single breaker-type distributor mounted for easy accessibility; more effective crankcase ventilation; timing mark on pulley or damper at front of engine; and a carefully engineered 3-point rubber mounting system.

Savings in gasoline mileage of up to 10% have been achieved. The major factors responsible for this increased economy are: (1) manifolding that gives more even fuel distribution to each cylinder; (2) new combustion chamber contours which permit high compression without detonation even when using non-premium fuels.

FORD MOTOR COMPANY



One farmer slid down a haystack and was impaled on the handle of a pitchfork.

The modern farm is planted with more booby traps than a battlefield. Last year they caused nearly 20,000 violent deaths.

By Roger Dunham

CITY folk, pent up in a tense rat race for a living, dream of breaking away to the country and relaxing serenely on a peaceful farm of their own. They do not know that the quiet little American farm of their dream can be a deathtrap—a deathtrap more deadly than any battlefield in World War II.

During the four years of the war, 1,100,000 of our soldiers, sailors and Marines were killed or wounded. In 1947 alone, 1,800,000 people were disabled or met violent death in farm accidents—and that toll of needless casualties is growing more appalling every year!

The death that lurks on the farm wears a serene mask. It was a quiet day in the country when

36 Ways to Stay Alive

MACHINERY AND EQUIPMENT

1. Spread tractor wheels to reduce tipping hazards.
2. Keep guards in place on power shafts and belts so you won't be caught—and mangled.
3. Turn off the power before you adjust or unclog machinery.
4. Fill tractor tires ¾ full of liquid to reduce bouncing.
5. See that the tractor is out of gear with the brake set before you crank.
6. Don't wear loose or torn clothing or ragged gloves around moving machinery.
7. Keep tractor speed under 4½ mph for off-the-road operations.
8. Don't climb around combine or thresher when it is running.

BUILDINGS AND FARMYARD

9. Put guard-rails on ladder-openings, stairways, wells and cisterns.
10. Have ladders handy in case of fire but don't put them where children may climb.
11. Yank nails promptly from loose boards.
12. Keep the farmyard clear of tools, pitchforks and rubbish.
13. Clear ice from steps or paths or sprinkle them with ashes.

FIRES

14. Keep barrels of water in buildings or have hose attached to the water system for fire emergencies.
15. Have boxes of sand ready to help fight oil or gasoline fires.
16. Hang lanterns on convenient hooks or wires.
17. Store gasoline out of doors, underground or in an isolated building.
18. Clean off cobwebs and dust from electric motors or large light bulbs.
19. Keep fire extinguishers at building entrances and check regularly.
20. Place each brooder house at least 100 feet away from any building.
21. Keep cars, trucks and tractors in buildings separate from barns.
22. Don't burn rubbish on a windy day or near buildings or haystacks.
23. Watch the temperature of newly stored hay, which may heat up and catch fire.

ANIMALS

24. Be careful not to surprise an animal; speak gently before entering a stall.
25. Dehorn cattle and cut boar tusks short.
26. Use special care in handling animals with newborn young.
27. Tie horses securely before leaving them and keep harness in good repair.

ELECTRICITY

28. Use proper-sized fuses—usually not over 15 amperes for lights—in all electric circuits.
29. Use moisture-proof cords for outside weather conditions and heavy rubber cords for motors.
30. Learn first aid for electric-shock cases.
31. Keep pathway to main switch box clear.
32. Don't replace burned-out fuses with coins, wire or other metal.

HAND TOOLS

33. Check hammers and axes to see that heads are secure and that handles are in good condition.
34. Put away every tool in a definite storing place after using.
35. Stroke from behind when you whet tools to avoid cutting yourself.
36. Keep dangerous tools safely away from play areas.

Photos on opposite page courtesy American Red Cross

Farmer Hedge climbed into the hayloft on his farm near Leavenworth, Kansas, to get fodder for his cattle. Some of the cows were shuffling and mooing gently in their stalls. Farmer Hedge leisurely tossed down a batch of feed, then dropped the pitchfork into the pile.

He stepped down for the ladder but missed the top rung. His plunging body broke the second rung, kept falling and landed on the pitchfork handle. The "safe" handle pierced all the way through his abdomen—and trapped the farmer in agonizing death.

Farmer Hedge was only one of the 19,500 victims to lose their lives last year in Deathtrap, U. S. A.—the typical American farm. John D. Rush of the U. S. Bureau of Agricultural Economics puts it mildly when he calls farming "one of the most hazardous of all occupations."

We have been greatly concerned with preventing industrial accidents. Based on percentages of accidents to workers, farming is nearly three times as dangerous as manufacturing. Yet little is done to halt this terrible slaughter on our farms. There are no safety supervisors to patrol the farm and warn the farmer and his family of the hidden hazards menacing their lives.

Dr. Kennedy Creevey of Cambridge, Massachusetts, and Dr. John W. Powers of the Mary Imogene Bassett Hospital at Cooperstown, New York, made a survey of farm accidents, their locations and their causes. Here's a summary of their findings:

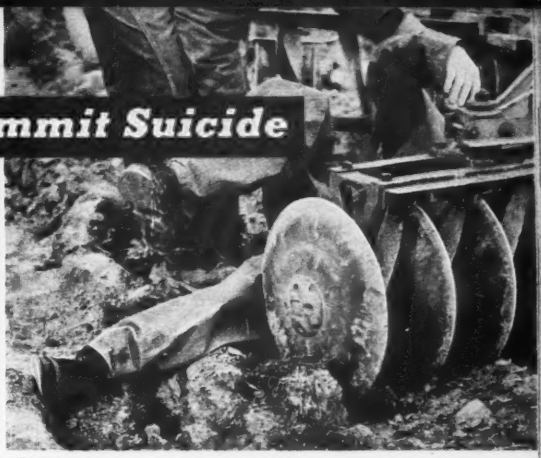
1. Most farm accidents occur in the barn or the barnyard. Their victims range from five to 50 years old, with the majority of the accidents involving these age groups: 15-19, 30-34 and 45-49.

2. Falls are the chief source of farming tragedy. Next in danger come machine accidents, injuries from livestock and burns.

3. Mid- [*Continued on page* 94]

6 Ways to Commit Suicide

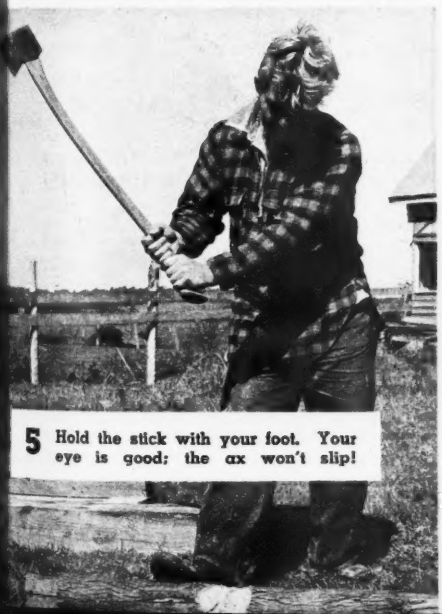
1 Your tractor defies the laws of gravity. Crank it on a hill; it won't roll on you.



2 Don't inspect your machines regularly. If your seat falls off, you can get a new one.

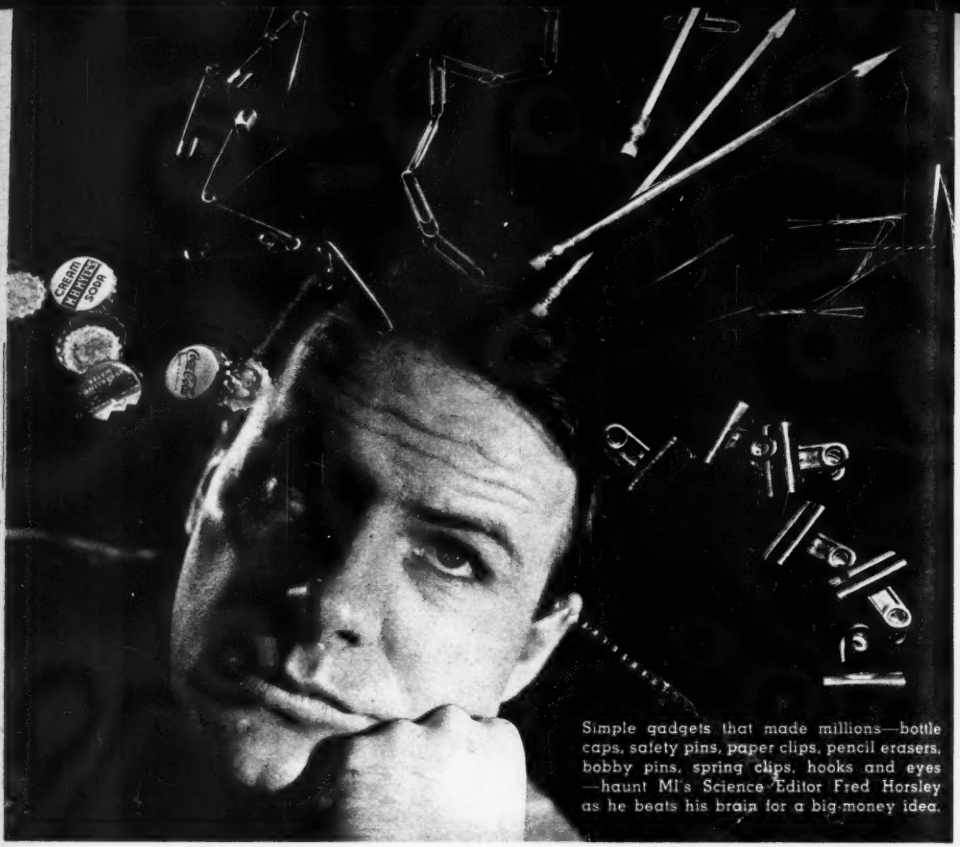
3 Enjoy a smoke frequently. And what could be a better spot for one than a hayloft?

4 Jump down! It's always the quickest way. Take the pitchfork along just for luck.



5 Hold the stick with your foot. Your eye is good; the ax won't slip!

6 Swing the knife toward your leg. You won't slash deep into the flesh.

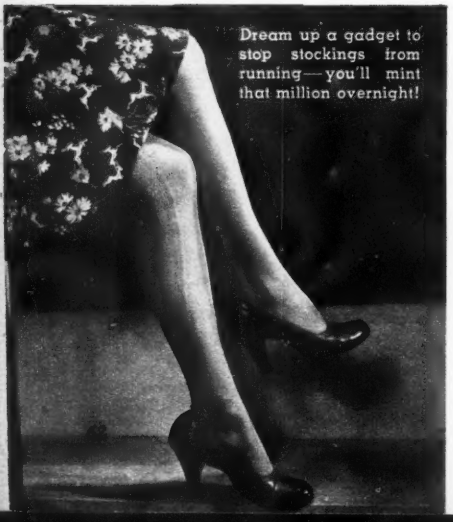


Simple gadgets that made millions—bottle caps, safety pins, paper clips, pencil erasers, bobby pins, spring clips, hooks and eyes—haunt MI's Science Editor Fred Horsley as he beats his brain for a big-money idea.

How To Become a Millionaire

It's easy to strike it rich—if you can invent a little gadget that'll simplify an everyday problem . . . like shaving or opening a beer bottle.

By Lester David



Dream up a gadget to stop stockings from running—you'll mint that million overnight!

GETTING rich quick is no problem these days for a man who's got ideas. There's a standing offer of a million dollars to anyone who can invent a practical method of bottling chocolate soda. And a fortune is waiting for the bright young man who can come forward with a beer or pop bottle top that you can yank off with your fingers.

Billions of dollars are lying in the treasuries of the nation's industrial corporations, ready to be paid out to the inventors who can supply the keys to such simple mysteries as these.

In this age of complex science, with technicians working in "Buck Rogers" labs filled with cyclotrons and awesome apparatus networked with wires, flashing lights and a myriad of buttons and levers, you'd think that the day

of the simple invention is past. But the big manufacturers thunder a solid no! They want uncomplicated gadgets that simplify everyday chores. And they want these gadgets badly.

They want creations like the bobby pin, which poured gold into the bank account of the man who put a wave in a piece of wire, bent it double and gave women a cheap but vital means of keeping their hair in place. They want ideas like the paper clip, the safety pin, the corkscrew, the can opener, the carpet sweeper. None of these ideas called for cyclotronic knowledge and all of them made millions for the inventors.

Almost every big business is chasing its own particular will-o'-the-wisp, an elusive shadow of an idea which floats tantalizingly beyond the grasp of top-notch scientists. Inventions are sought in virtually every manufacturing field today, for typewriters, cigaret goods, shaving devices, household appliances, hosiery, rubber and hosts of other products that need specific improvements. Any better ideas along this line will unlock the mint for you.

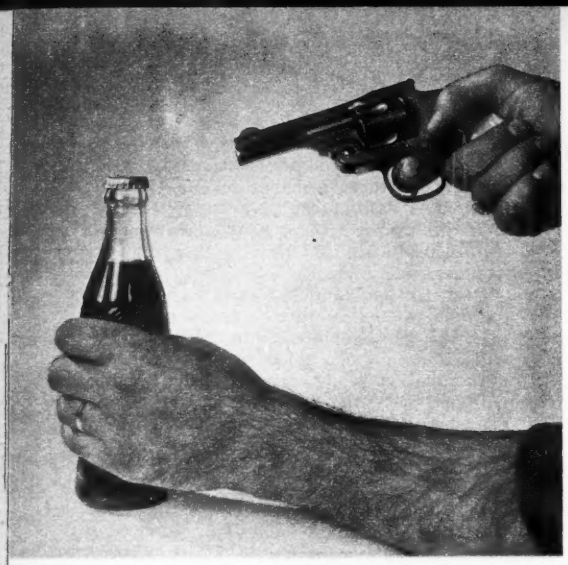
Take, for instance, that chocolate soda. To bottle it would seem easy enough. Just mix chocolate syrup with carbonated water in the right amounts. But the rub lies in the syrup itself, which is high in butterfat. This turns rancid within a couple of hours after the soda's taken off ice. So, the bottle must be constantly refrigerated—in transit, in storage and in the showcase. Manufacturers find it too costly to market such a perishable product despite the big demand.

On the other hand, if a soda maker took out the butterfat, the drink would lose much of its chocolate flavor. Many substitutes have been tried but no one has yet matched that tempting phosphate whipped up by the soda clerk at the corner drugstore.

Figure out a way to mix the syrup with fizz water so that you can refrigerate the soda economically—or cook up a syrup that has no butterfat but still tastes like real chocolate. Take your idea to any beverage company—then your only troubles will be sore hands from clipping too many coupons.

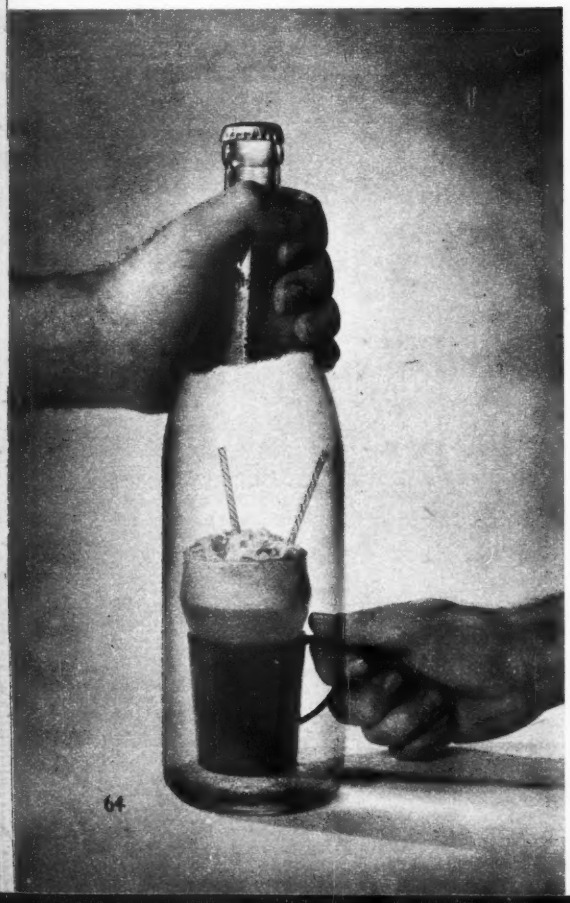
Back to that bottle top you can pry off with your fingers. . . .

The cap currently in use on pop bottles combines simplicity with sufficient strength to seal in tightly the fizz—or carbon dioxide. Up till now, paper tops haven't been tight enough to keep the bubbles from escaping and thus proved impractical.



Shooting the top off a bottle is the way they did it out west. Hand-removable cap is badly needed.

A million dollars is waiting for the man who can work out a practical way to bottle chocolate soda.



Some manufacturers have tried caps that you could lift off by the metal grips that clamped on the bottleneck. These caps turned out to be too expensive to produce for any popular-priced soft drink.

Any cap that did away with the bottle opener without boosting the price of the drink would be grabbed up faster than an atom-powered auto with built-in showers.

Let's take a look at a good looker's stockings. . . .

Irene, that cute little typist, leans over to open the bottom drawer and catches a glimpse of her left nylon:

"Oh darn, and double darn (and words to that effect)! A run—and I just put those stockings on for the first time this morning."

Quickly she uncorks a bottle of colorless nail polish and dabs a little at each end of the run to keep it from spreading. But Irene knows her polish is a poor makeshift. By evening that stocking will be completely ruined. That's $1.75 gone to "sheer" waste for our little lady.

There's not much else Irene can do to stop a run—and nothing at all to fix it so that the stocking will look like new again.

Multiply our little Irene by the millions of women in our country. You get an idea of the big market waiting for an inexpensive gadget that women can carry in their purses and whip out to mend runs the moment they start.

Now let's join the men again. . . .

Ever since William Gillette thought up the safety razor, any new device to ease the chore of daily shaving has had some measure of success. New types of razors, different kinds of blades have sold well, even though they varied but slightly from those already in use. Men go big for anything that holds out hope for better shaving.

Make a rustless steel blade that'll give a guy 50 shaves without honing or stropping—or feeling like a broken beer bottle scraping through your whiskers—and you can write your own check in seven figures. The best blades you can buy today will rust and grow painfully dull after a few shaves.

No one has yet invented a workable device for holding up a man's socks without a taut band around the calf. [*Continued on page* 140]

THIS MONTH'S

prize gadget

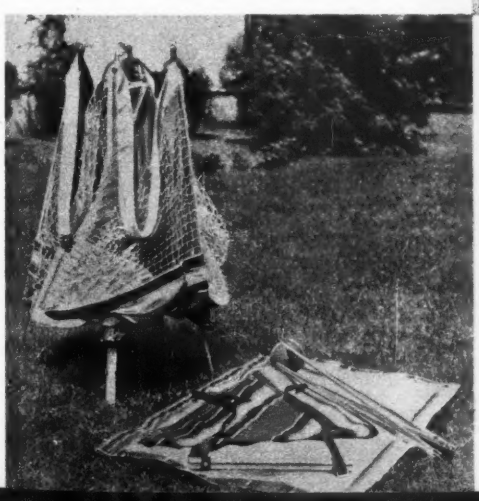
Junior's play-pen paradise has lots of room for romping. Carrying-handle in center doubles as trapeze.

Kiddie Korral

MRS. Fischer sat on the beach looking longingly at the water. "Sorry," she said to her husband, "but you'll have to take a dip by yourself. I can't leave the baby all alone."

After weeks of solitary swimming, W. E. Fischer of Freeport, N. Y., decided something would be done and the portable "Kiddie Korral" is the result. Made of aluminum, fishnet and canvas this play-pen weighs only 11½ pounds. It's small when folded (7 by 36 inches) and full-sized when open (41 inches square by 31 inches high).

Now, the whole family is satisfied. Especially Mr. Fischer—he receives MI's $50 prize gadget award. •



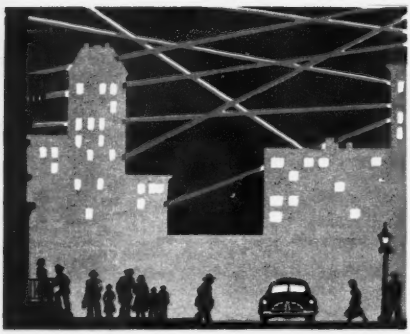
That's no golf bag slung over Mom's shoulder, above—it's a Kiddie Korral. Aluminum and canvas parts, left, are easily assembled.

WIN $50

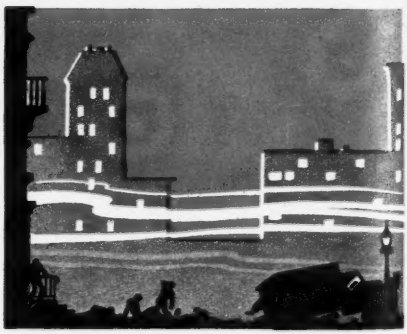
Gadgeteering your hobby? If you've dreamed up a neat gadget, send a description of it along with pictures to Gadget Editor, MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y. Each month the best entry in the opinion of MI's editors will be given a $50 prize gadget award.

ATOMIC DUSTER

...Deadliest Weapon

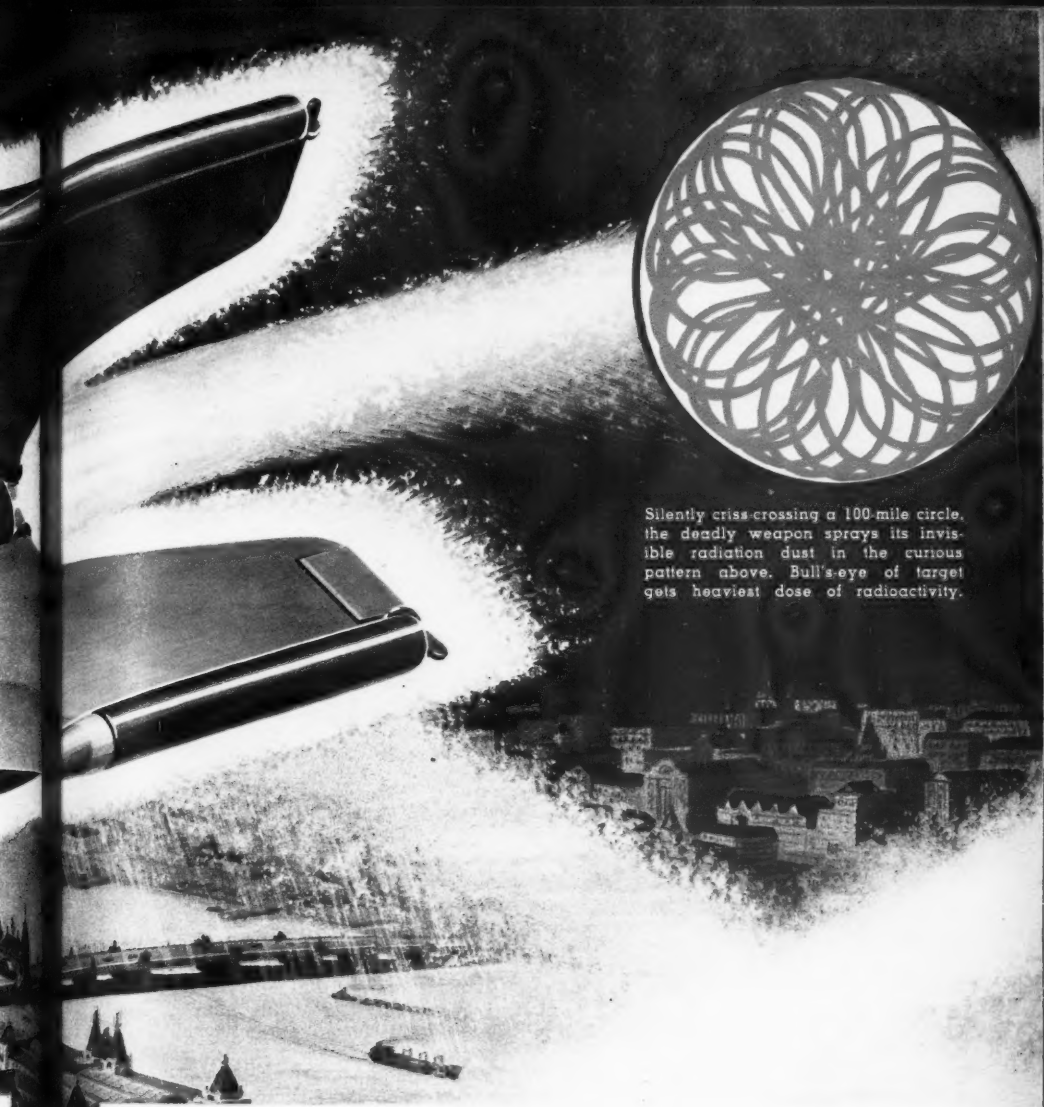


Everything still looks normal that first night while the Atomic Duster circles above the city.



Several days later, people start bleeding to death in the streets—victims of atomic dusting.

FRANK TINSLEY '48



Silently criss-crossing a 100-mile circle, the deadly weapon sprays its invisible radiation dust in the curious pattern above. Bull's-eye of target gets heaviest dose of radioactivity.

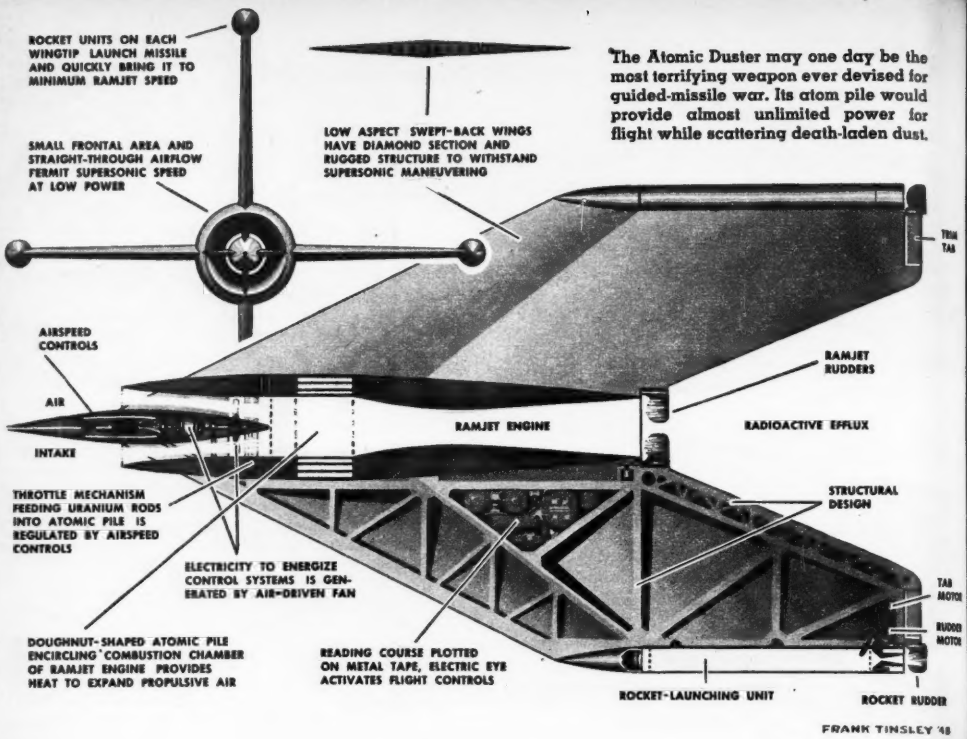
Fog of death radiates from the radioactive missile as its nuclear engine whips it at supersonic speed over the enemy's city.

By Frank Tinsley

THE sudden swirl of snow high on a wind-swept Alaskan peak may doom a key city half-way around the world. For that swirling snow may unveil the most fearful weapon ever to terrorize a people—the Atomic Duster.

The snow whirls upward on the slope as a hidden hangar door opens and reveals a strange, red-winged missile down into a concrete pit on a big dolly.

In the twilight of the first day of that dreaded World War III, shielded flashlights are probing the dark shadows in the pit as the parka-clad crew muscles



The Atomic Duster may one day be the most terrifying weapon ever devised for guided-missile war. Its atom pile would provide almost unlimited power for flight while scattering death-laden dust.

the missile into position on the launching rails. Silhouetted against the afterglow in the west, the set of rails thrusts boldly skyward like a great framework cannon.

Carefully, the crew commander runs his flashlight over the gleaming surfaces of the red missile. At last, he steps behind the shield and takes his post at the firing panel.

"Stand by for launching," he shouts tensely. "Clear the pit!"

The fate of the sheltered city where the enemy has been concentrating his atomic war work rides on those towering rails. But will everything run with the exact split-second precision—the Jato rockets, the atomic-pile feed, the complicated directing mechanisms?

The commander stares at his watch. His hand reaches out toward the firing button and his lips count off the final seconds aloud. His fingertip drops on the button. A searing flash sweeps up and flares blindingly against the snowy peak.

The Atomic Duster roars out of the pit and trails four comet streaks from its Jato launchers as it arcs faster and faster in a long, perfect curve toward its remote target.

Back in the pit, one of the operators at the telemetering dials calls off the airspeeds:

"Five-fifty—six—six-fifty! Enough speed for the ramjet to take over—the pile ought to be switching on now." A sudden shout from the crowd at the observation windows. Abruptly, the fading Jato trails are blotted out by the flaming exhaust from the ramjet engine. The atomic pile is working now, surrounding the combustion chamber with a terrific belt of solar heat.

For several hundred miles, the missile's course is radio-controlled from the launching site. Then, an automatic navigation apparatus guides the Atomic Duster. This navigating robot, whose lenses survey the heavens like the eyes of a human navigator, identifies the proper stars by measuring their light and color intensity. Then, guided by the relation of the stars to each other and to the center of the earth, the robot steers the missile on its predetermined course.

As the Atomic Duster approaches its goal, a homing device supersedes the navigation setup and draws her straight to the target city. Over the center of the target, a fourth mechanism takes control. This zig-zags the missile back and forth across a 100-mile target circle in a series of erratic runs, to foil interceptor jet planes or ground defenses. An electric eye picks up the missile's topsy-turvy course drawn

on a sensitized, steel tape. This eye governs the flight controls which are operated by electric motors.

In the city below, puzzled atomic workers gaze heavenward as the Atomic Duster darts back and forth across the target circle, like a giant needle darning a hole in a sock. Streaking at supersonic speed, the Atomic Duster is invisible in the darkness and much too small and speedy for radar detection. The whiplash roars of her ramjet engine are lost among similar roars of the vainly pursuing jet defenders.

Completely unshielded, the missile's atomic pile is radiating lethal neutrons and gamma rays in all directions, and a concentrated stream of the deadly particles blasts out of the ramjet exhaust. These settle slowly earthward in the same terrible fog of delayed death that struck down thousands of victims at Hiroshima and Nagasaki, days after the bombings!

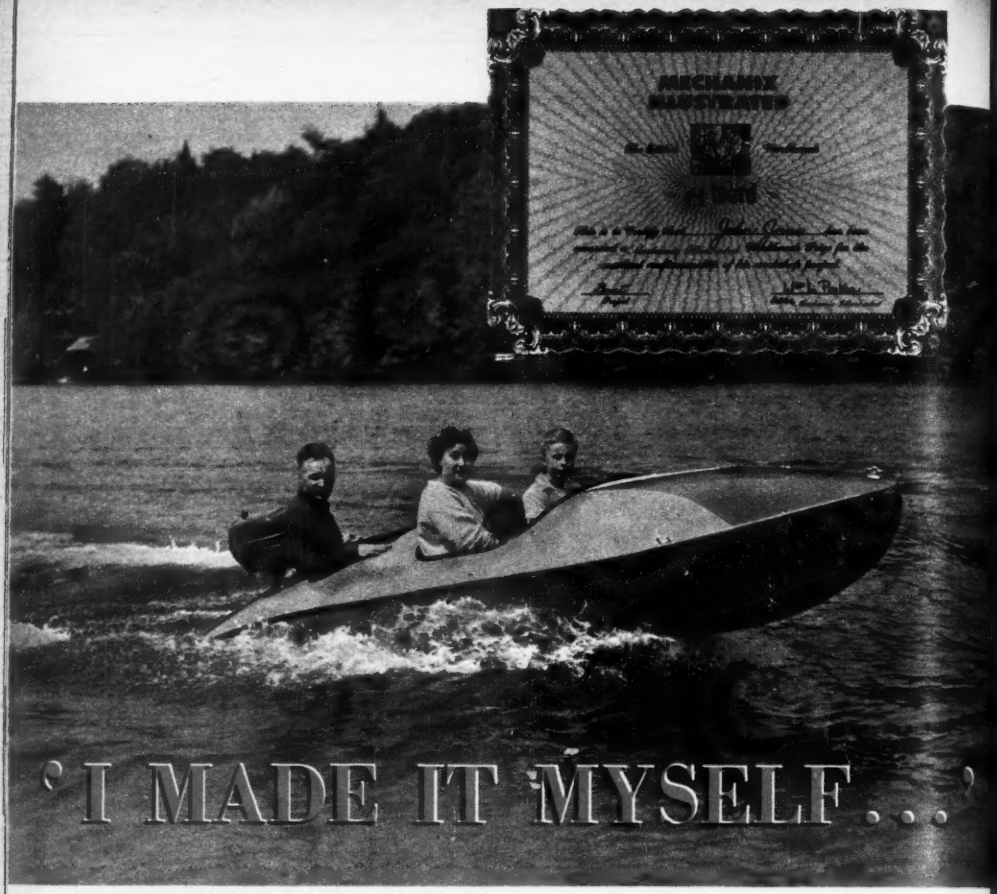
Hours later, the course control tape unreels toward its end as the Atomic Duster keeps shuttling over the doomed city. The workers in the atom plants are unaware of their mortal danger. Clicking Geiger counters, however, have already confirmed the worst fears of the nuclear scientists—and the high brass. Frantically, they flee.

Finally, the tape's end flickers past the missile's electric eye, and shuts the circuit on a high-explosive destruction charge. A sudden blast in the night signals the end, then bits of the super-radioactive missile shower down on the city.

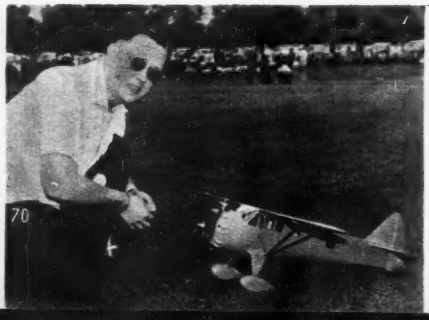
The atomic-powered ramjet in the Atomic Duster described here is mentioned in the latest progress report on atomic energy power plant development by Andrew Kalitinsky, chief engineer of the hush-hush Nuclear Energy for Propulsion of Aircraft project. The navigational controls are based on these now being developed by Charles A. McPheeters of the Navy's Bureau of Aeronautics.

Purely an anti-personnel weapon, it can wipe out a city's inhabitants without a dollar's worth of property damage. This does away with the backbreaking rebuilding programs necessary after conventional or atomic bombardment. Thus, the Atomic Duster may become not only the deadliest weapon in the world but the ideal club for a strong United Nations to brandish and keep even the most powerful aggressor toeing the peace line. •

Huddled in the dark corners of the dying city, like these Hiroshima victims, terror-stricken people would cringe in vain to escape their doom.



Tomorrow's car may copy some of the smart lines Alphonse Bedard of Dunham, Canada, built into his 55-mph three-wheel auto. Motorbike engine runs it.



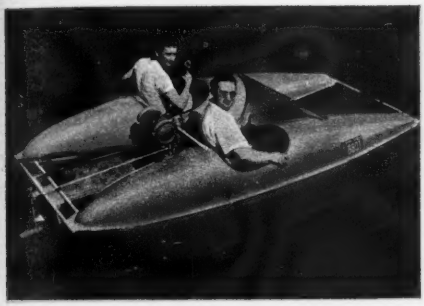
Marty Lihl, left, of West New York, N. J., copped two first places in air shows with "Mr. Mulligan," his control-line gas model plane (MI's Plan 374).

BUYING the fanciest yacht afloat won't thrill you half so much as building a little boat from odds and ends in your backyard and enjoying that craftsman's pride in your own creation.

And it's with pride, too, that MI points to these samples of the ingenious work that our craft-minded readers, aided by our tested plans and blueprints, are turning out. A fine example of this craftsmanship is the smooth Torpedo that Owen Griffiths of Utica, N. Y., is racing above, after finishing his first boat project with an assist from MI's Blueprint 991. Like the builders of the other projects shown here, Craftsman Griffiths won a $5 prize check and a handsome MI Workbench Award (see top of page). Now he can lean back proudly and say,

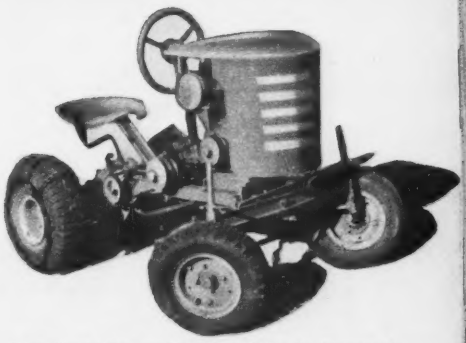
"You see, *I made it myself. . . .*" •

A couple of old piano boxes, a square of roofing, a barn sash, hardware for two doors and paint were all J. P. Mason of Pekin, Ill., needed to make this pert playhouse for his granddaughters.



Plane's belly tanks serve as the double hull of this odd craft. Bunny Ronco of Allentown, Pa., added watertight compartments to make the 235-pound boat almost unsinkable. It can do 10 mph.

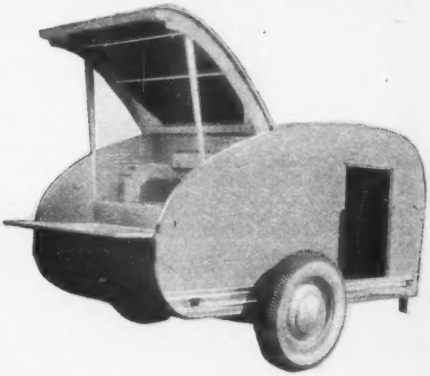
Cheesebox formed the body for this elegant model of an early French town car. Fred Kurz of Elizabeth, N. J., spent a year piecing out this auto with swabsticks, jewelry, even curtain-rod tires.



"Handiest thing on the place," Clyde Clymer of Lincoln, Neb., calls this neat, spare-part tractor he powered with an old scooter motor.

A nonsmoker, E. B. Fish of National City, Cal., adapted plans in May MI to make an aluminum-Plexiglas pipe. Smokes fine, his brother says.

A drill was the only power tool Bill Howe, Jr., of Pittsburgh used in constructing a snappy wood-and-metal midget auto that'll hit 30 mph.



Donald Slee of New Westminster, British Columbia, built this compact trailer for a breezy vacation on the open road. A modification of MI Plan HJ-12, Slee's job is streamlined in chrome-edged Masonite.

They Bring Down

Wrecking crane swings a 3000-pound steel ball high to crash the wall of a New York building.

Right, the big steel ball smashes against the condemned building with high-explosive force.

THE steam shovel quivered at the end of its boom like the head of a prehistoric monster scenting its prey. Its steel-toothed jaws opened slowly, then lunged forward to bite deeply into the pile of rubble. The mouth crunched shut on bits of stone and lumber and swung upward.

A loud rip and a startled cry rose above the clatter in the pit. A workman was looking with dismay at the seat of his pants, open to the vagrant breezes. Fluttering triumphantly from the teeth of the shovel high in the air was a wide square of cloth. With neat precision, the shovel had depanted the luckless worker who

Laughs, thrills, danger and gold dust—they're all in the day's work when a wrecking crew raises the roof and rips into a "dead" building.

By Irene Neer

the House

. . . And the walls come tumbling down! Ruins will make way for new housing.

House wrecking is dangerous business when you are teetering atop a crumbling old building.

Special lattice work, below, protects the wreckers —and the man in the street—from falling debris.

had wandered too close to its hungry maw.

You never can tell what the house-wrecking business will uncover! If it's not the seat of someone's pants, it's the long dead secret of a prison break which baffled the law for 38 years.

New York City's grim old Tombs Prison, which had housed the big town's most notorious criminals since the turn of the century, has just been razed. When a wrecker pried loose a section of plumbing in one of the upper tiers, a yellow, crumpled piece of paper fell out. He picked it up curiously, smoothed it out and read the large but faded block letters:

"WAIT FOR YOU IN CENTRE ST. THREE O'CLOCK SEPT. 2. ONE KEEPER."

During the night of September 2, 1912, Reynolds Forsbrey, the most desperate criminal in America, made a spectacular escape from the Tombs after boasting that the dismal fortress would never hold him. Forsbrey climbed up to a ventilator in his cell, tore it off with terrific force and slipped down the narrow air shaft. He crept through the carpentry shop and out into the yard under the nose of a solitary keeper, who was sleeping off a beery Tammany outing. Forsbrey put a board against the high stone wall, scaled it and dropped into Centre Street and freedom.

A month later he was seized in the Bronx apartment of a red-headed stenographer. Under grilling he stoutly insisted that he got no help in his break.

Now, 36 years later, a house wrecker comes up with the only clue that Forsbrey *did* have an accomplice on the outside. Someone knew that only one guard was on duty that night and smuggled the information to the prisoner, who then stuffed the note into the drainpipe.

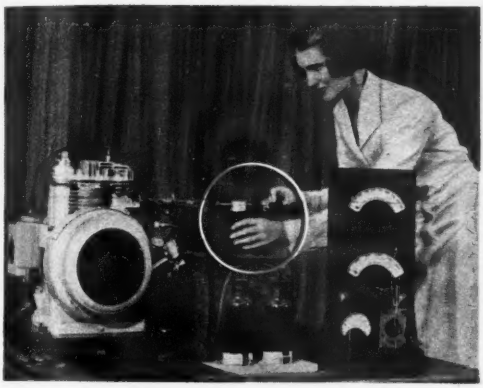
Wreckers are a tight-lipped, clannish crew who, strangely, see no romance in their trade. Take Albert A. Volk, one of the biggest wreckers in the country, who has "ruined" more homes than Demon Rum.

"There is no romance in our business," he says. "We're the morticians of the building industry. We tear down a deceased building and inter the corpse with no fanfare."

Get Volk talking, though, and he tells you of the time his men tore down the old Assay Office building on New York's famed Wall Street. This was the place where prospectors from all over the country sent [*Continued on page* 134]

NEW in SCIENCE

Parasite Jet, the McDonald XF-85, is designed to be carried in the bomb bay of the new B-36 (see MECHANIX ILLUSTRATED, March '48). Left, the tiny ship is lowered from a trapeze attachment; below, it zooms off on test flight.



Mechanical Cough Cure: Industrial "nurse" makes use of ordinary throat sprayer to cure a knocking motor with a new alcohol-water mixture called Vitrol. Injection of the fluid is equivalent to boosting gasoline's octane rating by 10 to 20 numbers. In actual use, it's shot into cylinders through a Vitameter—an auxiliary carburetor. Thompson Products, Inc., Cleveland.

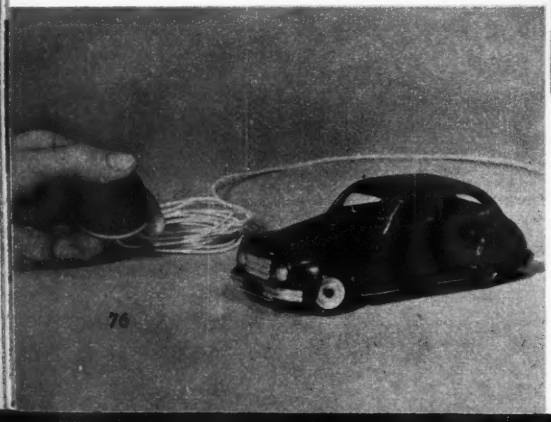
5 Per Cent Royalties for life if your design for a mechanical toy powered by this featherweight Mini Motor is accepted for manufacture by Arpin Products, Inc., Orange, N. J. It's a two-ounce, plastic-enclosed motor, powerful enough to operate a toy bulldozer or many other gadgets. On six volts it turns at 15,000 rpm; on a pen-cell at 4150 rpm. Got any bright ideas?

NEW TOYS for XMAS

Dog Family is recommended for your child by the Toy Guidance Council. Three puppies emerge from the zippered stomach of Mamma Pooch. Commonwealth Toy Co., N. Y. C.

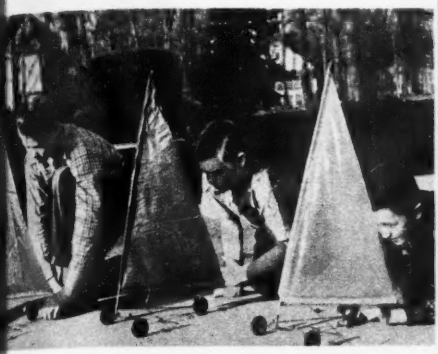
Toy-Making Toy puts him in the plastic production business. Kit has materials for preserving insects (inset) and making gadgets. Pittsburgh (Pa.) Fabric Products Co.

Playroom Panama is a miniature canal for Junior's baby fleet. Complete with locks, it can be enlarged just like model railroads. Hydro-Toys, Lewiston, N. Y.



Remote-Control Car is steered by compressed air. Pressure on the hand-held bulb does it. These English spring-wound autos are sold by Baird-Whitmer, Kansas City, Mo.

Sailing On Land is easy with these toys copied from the vehicles used on Florida beaches. Vinylite plastic sails catch even the slightest breeze. Sand Sailers, Inc., New York, N. Y.



Test-Tube Diver is raised to the surface and lowered again by squeezing a rubber bulb which inflates him. No sunken treasure is provided. Plastine Mfg. Co., N. Y. C.

Squirt-Machinegun is a half-size model of the Thompson sub-machinegun. It shoots 750 water "squirts" 25 feet—enough to drench invaders. Arpin Products, Orange, N. J.

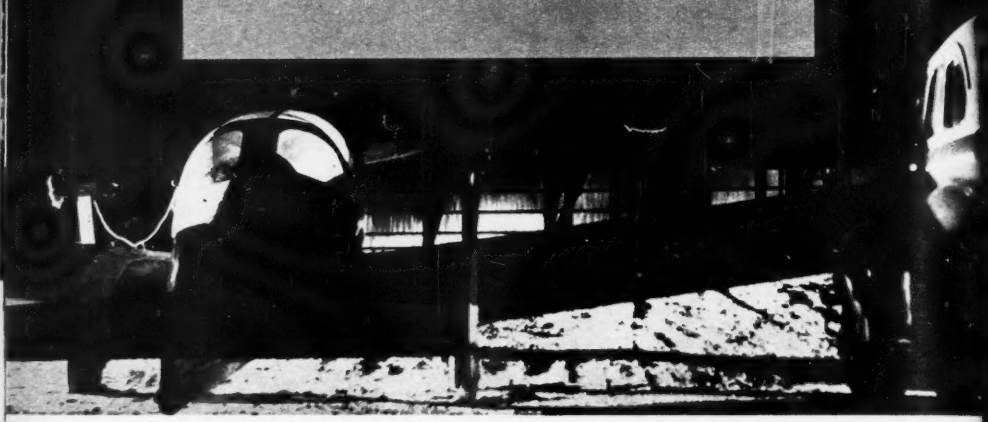
Plastic Dummy will keep the kids in fine physical condition. Ten-pound plastic balloon is two feet high and inflated like tire tube. Marty Gilman Inc., Gilman, Conn.

Electric Baby Fords may replace trains in modern youngster's favor. Cellulose acetate models are pulled along roadside fence. They're available through your Ford car dealer

Photo courtesy Modern Plastics

Fly-In Theater

Presents.....

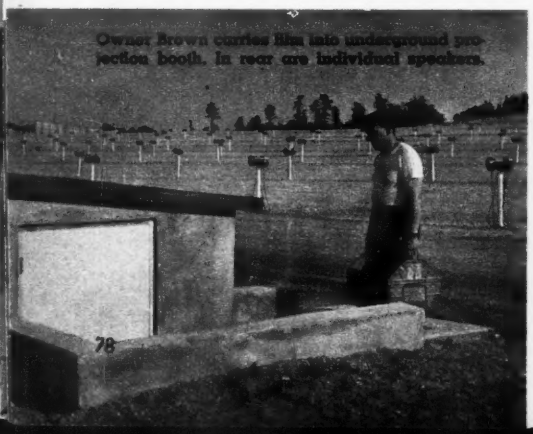


A CROWD of gobs watched the open-air movie at a Florida naval base. Suddenly, a small plane swooped down and circled the group a few times. As it moved off, the pilot leaned out and yelled, "Thanks for the free show, fellows!"

Edward I. Brown, Jr., one of the spectators, often thought about that incident. When he was discharged, he hit upon the idea for a fly-in movie. And the Fly-In Drive-In Theater at the Monmouth County Airport in New Jersey is the final result.

When a movie-going plane arrives, it's led to a theater ramp. The pilot cuts his engine and a jeep tows him to the parking stand where he's provided with an amplifier. When he's ready to leave, the jeep tows him back onto the strip where he can take off without ever having left the plane!

Now, when a pilot circles Brown's theater he's probably not peeping. More likely he's looking for a spot in the orchestra! •

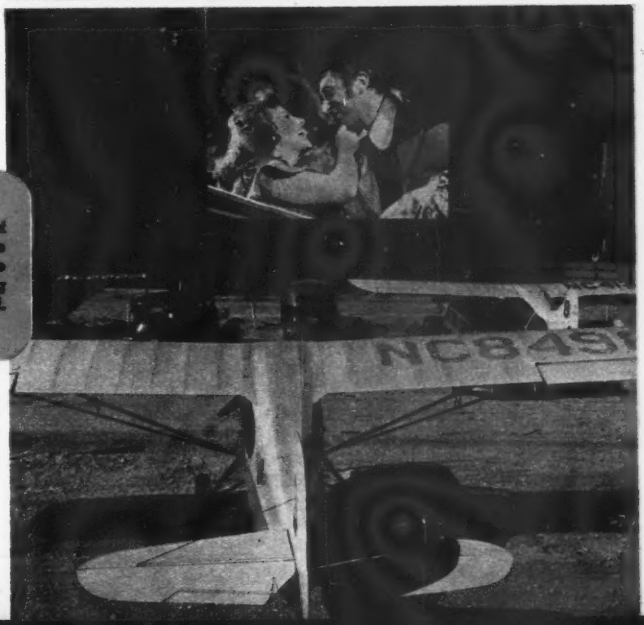


Owner Brown carries film into underground projection booth. In rear are individual speakers.

"Follow Me" jeep tows a new arrival along a ramp to a parking stand with a good view.

Attendant adjusts amplifier in the cockpit for the flying movie fans. The theater can accommodate over 20 planes and 500 autos.

Holding hands isn't against the rules. Brown has found that couples in planes at the theater act no differently than couples in cars.



Here's a pilot's-eye view of the screen. When the movie is over, the jeep tows the ship onto the adjoining strip for a quick take-off.

MI Photos
by Leo Choplin

Camera Stops Bullet–In Color

Photographer David Robbins made this sensational color shot of a bullet going through a glass of beer at 2 one-millionths of a second.

By David Robbins

"Impossible," the experts said but MI's staff photographer borrowed the Winchester labs—and did it! He shot the first color films ever taken of a bullet in flight.

MY camera stopped a bullet in mid-air! It recorded the event in color for the first time in the history of photography.

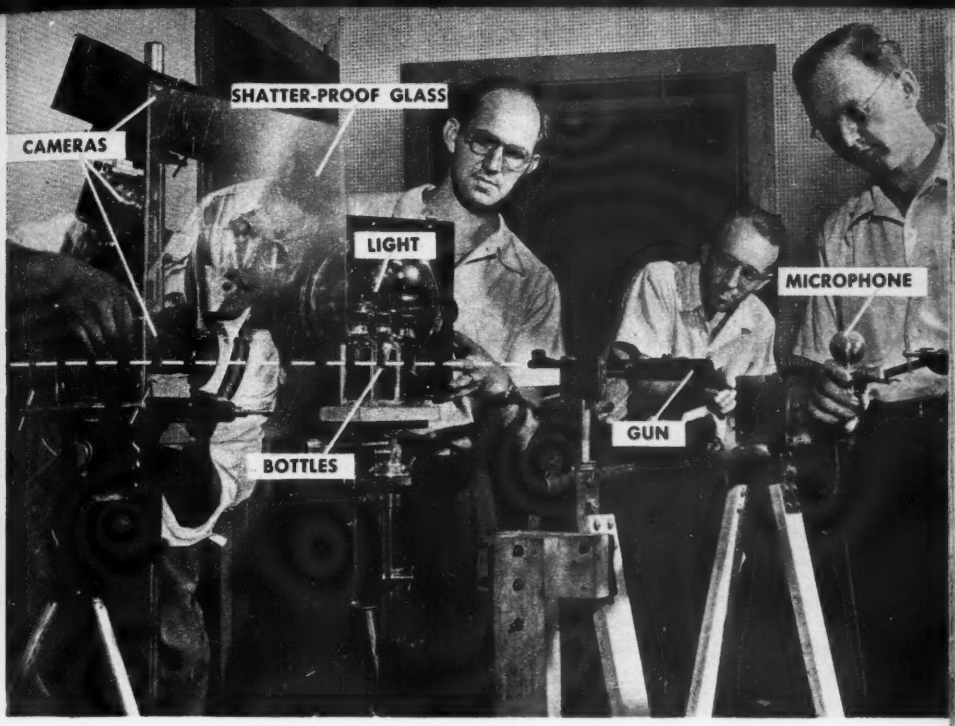
Here's how it came about. I heard that Winchester Repeating Arms Co. lab had an Edgerton light. With it they had managed to freeze the flight of a bullet on high-speed black-and-white film. I got the urge to try it with color film which has an emulsion speed at least ten times slower.

The Winchester Company OK'd my plan, giving me the freedom of their labs. What had started out as a photographer's dream soon became a scientific research project.

I thought that the biggest problem would be that of setting off the light at the proper instant. But it was not as complex as I imagined. We devised a comparatively simple system using a microphone to set off the light as it responded to the report of the gun. The mike was attached to the fully-charged light by an electronic relay. The bullet travels at about twice the speed of sound so we simply measured the distance between the muzzle of the gun and the point at which we wanted the bullet to appear. Then, we placed the mike at a point one-half that distance from the muzzle.

We used a bank of three cameras—all with high-speed lenses. Before each exposure was made, the room was darkened and the shutters were opened to a time-exposure position. The gun trigger was released and the sound of the explosion was picked up by the mike which in turn set off the high-speed light. Thus the bullet was photographed on the three cameras at 2 one-millionths of a second. This was repeated for the sequence of four shots, each time placing the mike at a slightly different distance.

The unusual shots you see on the cover and on these pages strengthen my conviction that the best way to accomplish a first is to try the "impossible" and keep your fingers crossed. Then if you're lucky, the great coincidence will occur. •



This is the actual setup for the history-making photos. The specter-like man moving the camera behind the safety-glass plate is Dave Robbins and the others are Winchester technicians.

Robbins' camera stops bullet as it (1) nears first bottle filled with colored water, (2) emerges from it, (3) plows through second bottle and (4) whizzes off after hitting the third.

Illustrator Gladys McHugh at her medical drawing board.

Surgery with a Paint Brush

By Don Romero

YOU'LL probably never see a painting by McHugh hung next to a Picasso in your local art gallery. But few Picassos will ever serve as useful a purpose as the drawings of Gladys McHugh.

She's one of the most talented medical artists in the country—the staff illustrator of the University of Chicago Clinics. Miss McHugh knows the human body literally inside out. In delivery rooms she's made obstetrical drawings of babies at the moment they were born. In hospital morgues she's made sketches during autopsies.

There's practically no organism in the human body at which she hasn't had a front-row look and of which she hasn't made a first-rate sketch. Instead of being hung in museums, however, Miss McHugh's drawings serve as illustrations in medical-college textbooks, reference works for doctors and in papers contributed to medical journals.

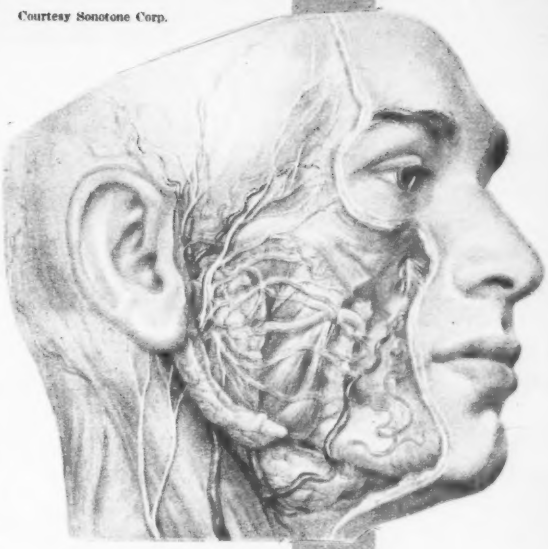
Her work has made her a head-hunter, too! Because embalming fluid changes the natural color and shape of tissues, Miss McHugh finds it necessary to keep using fresh specimens. When working with various parts of the head she often has to get one human head after another from the morgue in order to keep the naturally-colored exposure she requires. Although this scientific head-hunting may sound like a grisly business, it doesn't bother Miss McHugh. "It's just like taking a delicate, well-made watch apart," she says.

Her studio is filled with jars of preservatives containing specimens of human innards. For purposes of easy identification she baptizes them with names such as Joe, Ike, Mike, Petunia and McWitherbee.

The most important job Miss McHugh has done to date is a book of transparent views of the human eye. She did all her own dissecting and prepared for the work by practicing on dozens of eye specimens taken from monkeys and pigs.

Miss McHugh also illustrated a book on gastroscopy by the famous stomach specialist Dr. Rudolph Schindler. He invented the gastroscope, a flexible, tubular instrument which can be put down a patient's throat and into his stomach where it will give a clear view of the lining of the stomach. In making 97 colored drawings, Miss McHugh spent hours peering through the scope into cancerous, ulcerated and tumorous stomachs. One of her difficulties was making sketches at lightning speeds because the scope could only be inserted for a few minutes at a time. She became so proficient in this work that Schindler would sometimes ask her unofficial diagnosis of a case in which the coloring of a stomach was a good indication of the malady.

Courtesy Sonotone Corp.



Surgical paint brush of Gladys McHugh startlingly removes the skin from a human head and reveals the muscles, blood vessels and capillaries in full color.

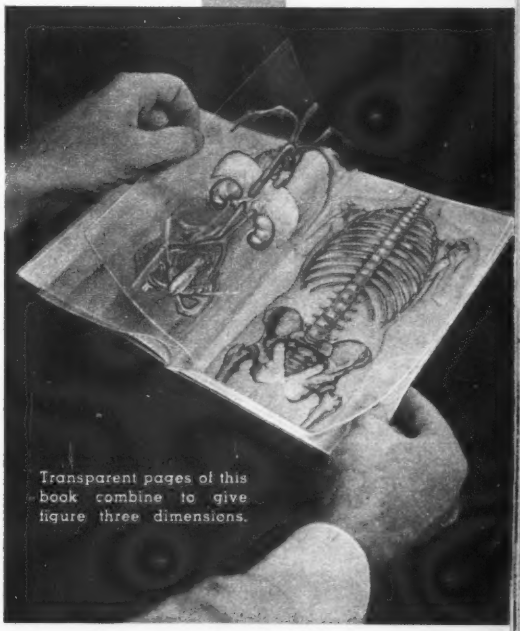
Although Miss McHugh is constantly being asked by aspiring students to give a course in medical art, she is far too busy a producer to take up the role of a teacher. She finds that too many young artists have little or no concept of the tremendous amount of research and training required.

"It takes at least five years of intensive study before a medical artist can even put a pencil to paper. The idea is to tell the whole story in as few illustrations as possible. This means a thorough understanding of your subject so that you can be sure of stressing only the high points. Also, in dissecting you must have the surgical skill to make a specimen reveal precisely the right exposure. And you have to know how to handle such instruments as the bronchoscope, otoscope, and gastroscope."

Miss McHugh uses a number of mediums in her work. Often it is pen-and-ink drawings, black-and-white wash or water colors. She also employs the technique of Max Brodel, one of her teachers—charcoal pencil and charcoal dust applied with a brush so as to produce delicate shadings.

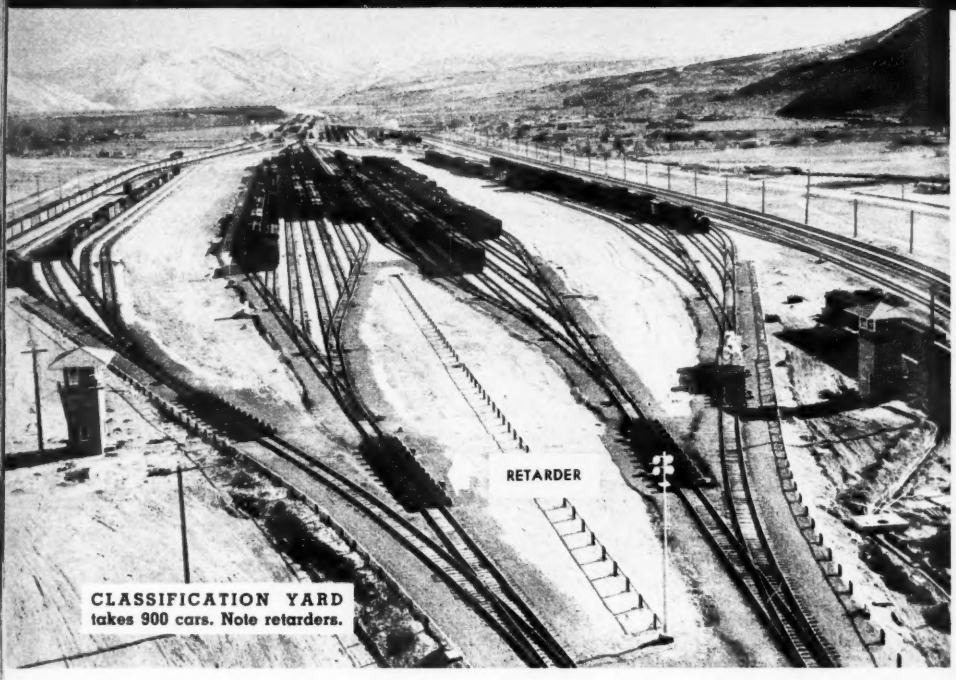
At one time she used to take postman's holidays and go out into the country to paint pretty landscapes. But she's stopped that because she can find nothing in the country to equal the beauty of the sights she sees in her medical work.

"Through the ophthalmoscope, the back of the eye is like a stately red curtain glowing with color," she says. "And through a gastroscope the human stomach is as beautiful as the most breathtaking sunset!" •



Transparent pages of this book combine to give figure three dimensions.

Shuffling Freight Cars by Radio



CLASSIFICATION YARD takes 900 cars. Note retarders.

THE visitor was looking over Union Pacific's new retarder yard at Pocatello, Ida. Loudspeakers atop the tower boomed:

"Jim, cut an ace, a deuce, an ace, a trey and eight aces."

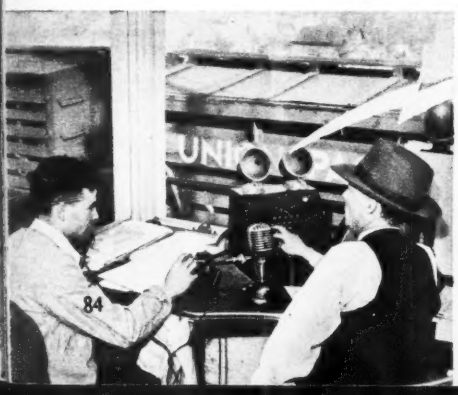
"Hah," said the man from K. C., "playing cards on the job!"

Which proved he didn't know much about either cards (a deck with 10 aces!!) or the way U. P. operates its $2,600,000 classification yard.

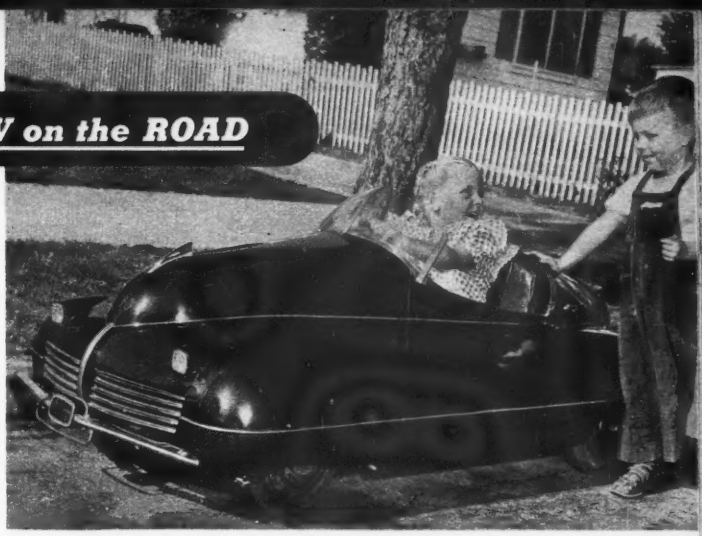
What he heard was the retarder yardmaster's tower telling switchman Jim to cut loose one car, then two, one again, then three and finally eight single cars.

It's quite a system. As trains arrive at the yard, they're pushed by six radio-equipped switch engines to the top of the incline. On directions given over the radio intercom by the yardmaster's tower (lower left), a switchman (lower right) cuts the cars loose. Seven air-activated retarders or braking devices prevent the rolling cars from gaining too much speed. Then they're guided to one of the 28 classification tracks which hold about 900 freight cars.

After the cars are grouped on these tracks, they're moved to the departure yard preparatory to hitting the rails East or West. •



NEW on the ROAD



$40 Hot Rod was made from old plane, auto and bike parts by Vernon Garrison, N. Long Beach, Cal., for daughter Barbara. Six-volt battery connected to auto-starter motor provides current for one hour of operation. If you press down on the combination accelerator, clutch and brake, the car glides ahead at 13 mph.

Trick-Cycle can take turns at high speeds without spilling the driver. Built close to the ground, the back of the seat is level with rear wheel and engine is low slung behind the front wheel. Above, Italian racer makes sharp turn. Ladies like comfort, right.

Mighty Mite is a working replica of the latest type truck equipment now in use in the West. It's built to a scale of 6 inches to a foot and is a perfect miniature of its parent Pacific Inter-mountain Express trailer

It's more profitable to upholster pianos than to play them. Here Nields puts finishing touches on one of his jobs.

I Jazz Up Old Pianos

By Charles C. Nields

"MADAME," I said, "surely you don't want to keep that ugly upright piano!"

The lady was refurnishing her house and I was helping her in my capacity as interior decorator for a San Francisco store. Everything in her home was modern. Everything, except the old piano.

"Really," she said, "I know it's out of step with the rest of the furniture but . . ."

Time and time again that routine was repeated. People would come in and buy smart-looking furniture only to ruin the effect by refusing to part with an outmoded old crate of an upright piano. They would cling stubbornly to their ancient eyesore for sentimental reasons, because they loved its mellow, out-of-tune tone or simply because they couldn't afford a new one.

Then I got the idea of upholstering the ghastly old boxes to blend in with the rest of the furniture. That bright idea—a completely novel one—turned out to be a honey!

It's an idea that any hustling young American can copy. There's no reason you can't have a business like mine provided 1) you're handy with tools; 2) you have an eye for beauty; 3) you can scare up about $300 for tools and equipment.

It was my idea to streamline the pianos by sawing off every geegaw, thereby reducing their bulk and eliminating their

Photos by Jaeger

Wheezing into the factory comes ancient eyesore, left.

Cutting the old crate to size, right, is first job on the list.

rococo ugliness. Then I would upholster them all over with leather, mohair or whatever material blended best with the decor of the room. The final touch would be a nailhead trim.

Let's examine, step by step, how you can go about setting up a business like mine.

First, make sure there is a market. I believe you shouldn't attempt to operate in a city of less than 50,000. The demand would be too thin in smaller places. The potential market is big—there are 12 to 14 million pianos in the United States. An astonishingly large percentage of these are out-moded.

Anyone handy [*Continued on page* 142]

Nields skilfully upholsters the newly shaped piano, left.

Milady emerges sleek and trim from the shop, right.

Tom McCahill reports that Kaisers can take it. Here De Luxe model makes good showing on a rough road.

MI Tests the Kaiser-Frazer Cars

"The K-F people have done wonders," says Tom McCahill. "And the autos can hold their own with the best on the road."

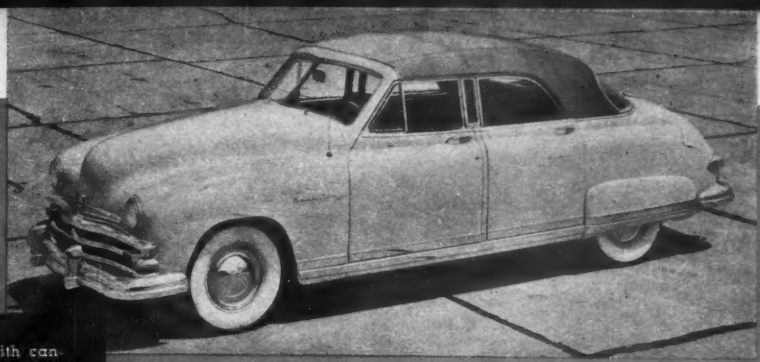
WHEN we first tested the Kaiser-Frazer automobiles a couple of years ago, the company consisted of about six bucks worth of tools, two hand-made cars and lots of plans for the huge Willow Run plant, then 99 per-cent empty. MI's test of the 1949 models proves beyond a doubt that Kaiser and Frazer autos have come a long way since then.

The first Kaiser had a disappointing front-wheel drive with all the agility of an elephant in the Ballet Russe. Since then, the Kaiser and Frazer people have really done wonders. They've built over 300,000 cars—and darn good ones, too—far superior to those built by many of their competitors.

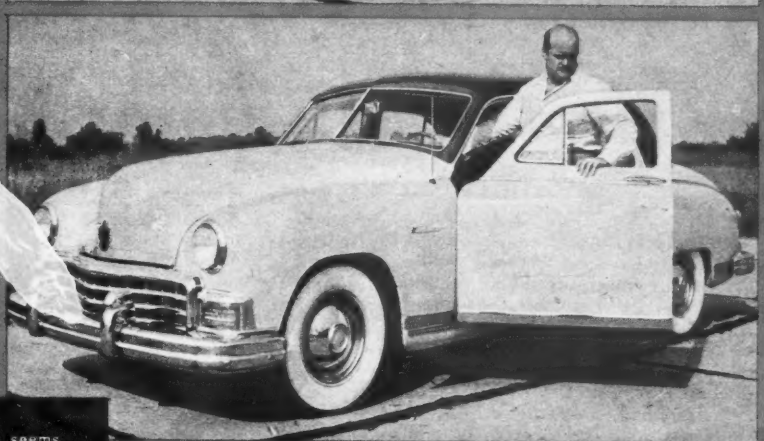
Let's first examine the difference between the Kaiser and the Frazer cars for 1949. For all practical purposes they are the same. The Frazer is a super-deluxe Kaiser of identical specifications and power plant. The Kaiser is simply a standard or cheaper Frazer.

When I arrived at Willow Run to test the new models, I had allotted two days for the job but was crossed up by the rainy weather. As my schedule called for another stop several hundred miles farther West, Hal Babbitt of public relations suggested taking one of the new cars for a test run and leaving mine at the plant. He didn't have to make that offer twice as the surest test is hundreds of miles of open road work. I felt like a road show version of Mata Hari when I pulled away from Willow Run in a 1949 custom Kaiser—disguised in a 1948 body.

The new car has greater horse power than the 1948 models and is equipped with over-drive, a feature formerly unknown in the Kaiser. The [*Continued on page* 136]



dtop Frazer, above, with can-
covered steel roof, looks like
sleek convertible—but isn't.
four-door convertible below
xactly what it appears to be.



wer Look" Manhattan seems
e built closer to ground. It's
though—another Frazer trick.
ow, 14-inch-wide arm rest may
serve as a seat for Junior.

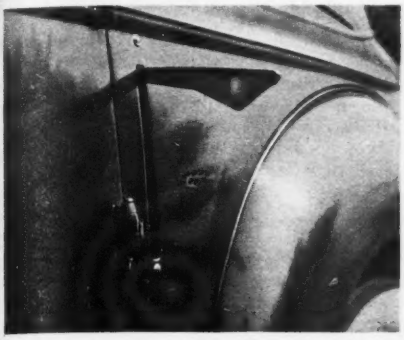
Meet the Hillman Minx

By Tom McCahill

THE Hillman Minx is one of the latest English products to invade our shores. This eye-arresting little automobile, halfway in size between a pony and a jeep, is another screaming example of English quality craftsmanship versus American mass production.

For testing I selected the convertible (drophead coupé to you, old boy) and found many features to be admired—and a few for the minus sheet. The car's convertible top and paint job made me wish that someone around Detroit would pass the hat and send some of the jokers of that city, who are responsible for American top and paint work, to England for a few badly needed lessons. American convertible tops, since the war, have been for the most part a disgrace to the industry. The Hillman tops haven't any electric motors (to *sometimes* work for raising and lowering them) but the custom tailoring and perfect fit of the expensive, smart-looking silk mohair fabric more than make up for any inconvenience along this line. The paint job was to me the most telling quality of all. The black paint on the car I drove had a rich, deep quality not seen for years on our poorly covered cars. By comparison our offerings, so far as painting is concerned, look like five-and-dime waste baskets on wheels.

The British put a lot more handwork into their cars than we do and for the man who gets a bang out of expert craftsmanship—solid doors that really fit, hinges (three instead of the two that American cars have) that are solidly hung, windshield and window mouldings precisely machined and leakproof, carefully tailored real leather upholstery, and all the other little details that add up to Quality—the Hillman will please him. Enough, no doubt, to offset the fact that because these are quality cars and imported ones too, the prices may seem a little steep for small automobiles. The convertible sells for just under $2200. delivered, the four-door sedan (with slid-



Mechanical arms on both sides of the Minx flash lighted warning for right or left turn.

You can adjust the driver's seat to any one of four heights by twirling the rear support.

ing roof over the front seat) for slightly less than $1900. Believe it or not, the delivered price in England is higher than it is here, thanks to heavy British taxes!

My test consisted of some 150 miles of driving on Long Island where I had a chance to run it on parkways, rough roads and in traffic. On the parkways it cruised along with the rest of the crowd with ease at speeds from 45 to 55. On rough roads, this car, weighing 2200 pounds, absorbed the shocks with all the comfort of a car weighing a thousand pounds more.

American drivers who like to rattle their mother-in-law's back teeth with a whirling getaway in traffic will find the Hillman engine too small for this hobby as it develops only 40 horsepower at 4100 rpm's. Like many underpowered continental cars, the Hillman depends on much gear shifting to keep up to American cars which can drop down to, say, 10 miles an hour in high and then pick right up in speed again without changing gears.

Like most European cars, the Hillman has four speeds forward, first speed being an extra low. For normal driving you start off in second, with the shifting positions

Want to convert your convertible into a smart town car? McCahill, above, finds he can cruise the Minx drophead coupe (convertible to you, chappie) with top at half mast. Right, top's all the way up.

being just the opposite of those on American cars (remember the old Buick?). To get into reverse, you pull out a knob on the end of the gearshift lever and drop the lever down and toward you. When you're parking in a strange garage it's therefore a good idea to show the attendant how to shift, or leave a little diagram taped to the steering wheel.

To compensate for considerably lower power and the necessity of a lot more gear shifting in traffic and on hills, the Hillman is extremely economical on gas consumption. This car will give from 30 to 35 miles to a gallon of gas. Our Ford, which is only 800 pounds heavier but develops 60 more horsepower, far outstrips it in the power department but uses better than twice as much gas. The Hillman "petrol tank" holds a mere eight gallons to Ford's 17. Q. E. D. As for speed, the Hillman can do between 67 and 69 on a level road after a good build-up. I've driven the new Ford better than 90 more than once.

We Call It . . .	British Call It . . .
Sedan	Saloon
Convertible	Drophead coupe
Hood	Bonnet
Top	Hood
Windshield	Windscreen
Luggage Space	Luggage Boot
Fender	Wing
Bumper	Fender
Back cushion	Squab
Gas tank	Petrol tank
Tire	Tyre
Dimmer Switch	Dipper Switch
Monkey wrench	Adjustable spanner

The most noticeable weak feature of the Hillman body design is the almost toy-like bumpers. They look good and no doubt they are made of very strong steel, but they are entirely too small to offer adequate protection against normal traffic contact with our massive American bumpers. Bumper guards are an absolute necessity. Fortunately there are several good brands on the market which fit this car and which cost less than the replacement tariff for a Hillman Radiator grille.

One of the most unusual features of the Hillman is the low-expansion pistons. These pistons are oval or nearly egg-shaped when cold, with the long axis at right angles to the crank shaft. As the piston warms up in operation it becomes perfectly round, a "T" slot providing the necessary flexibility for controlling the expansion during the period of changeover from oval to round. These pistons, in their odd shape during warm-up, are almost cold slap-proof.

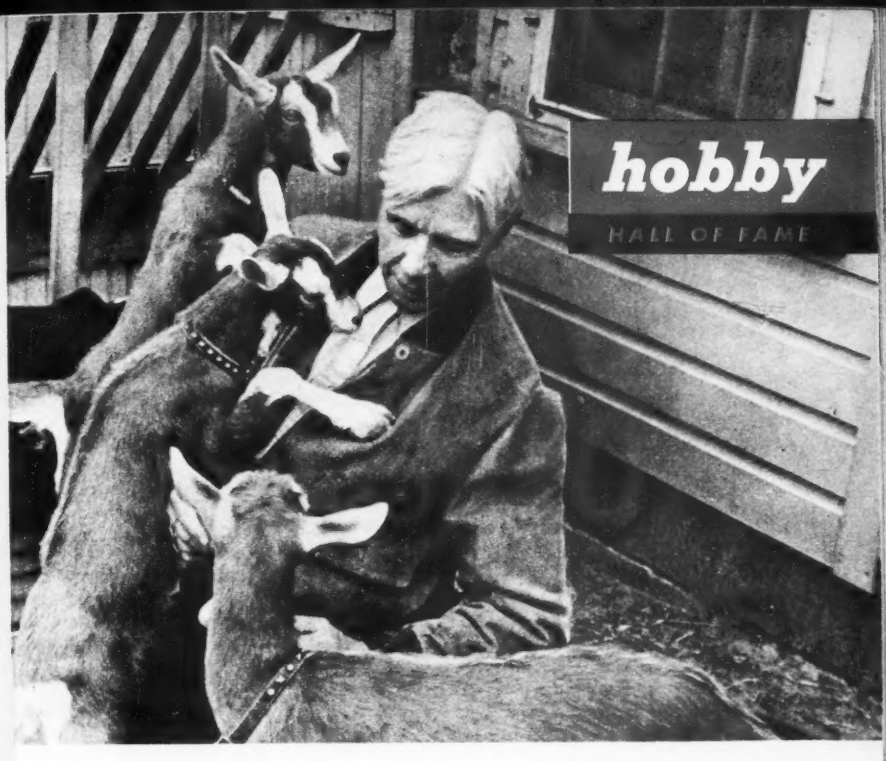
Another neat gimmick on these cars is the bucket front seats. In addition to being adjustable for leg room, they are adjustable for height and slope through the simple manual operation of a four-sided rear support, which gives a choice of four different seat heights. (See picture on page 91.)

The wheel base is 92 inches with a 6¼-inch ground clearance. The engine has four cylinders with a 2.48 bore and a 3.74 stroke. Maximum horse power is 40 at 4100 rpm's. Compression ratio is 6.3 to 1. Fuel tank capacity 8¾ American gallons. Tire size 5.50x16. Overall width 60½ inches. Overall interior width 51 inches, rear seat. Overall height 62½ inches. Overall length 156 inches. Hydraulic four-wheel brakes.

Since February of this year Hillmans have been imported into the U. S. at the rate of about 350 a month. The figure will be stepped up to 1000 a month around the first of the year. Agencies now pretty well cover the Eastern seaboard and South and are scattered through the Midwest as far out as Minneapolis and St. Paul. West Coast agencies will open early in 1949. Because immediate delivery is a cardinal selling point, the importers are opening new agencies only as fast as they can get cars shipped in from England. As for parts, they claim they can deliver anything required to any place in the United States within 24 hours.

I will recommend the Hillman highly, provided its limitations are recognized and the car is accepted for what it is: a fine, small automobile of excellent quality, superior workmanship and standout appearance. •

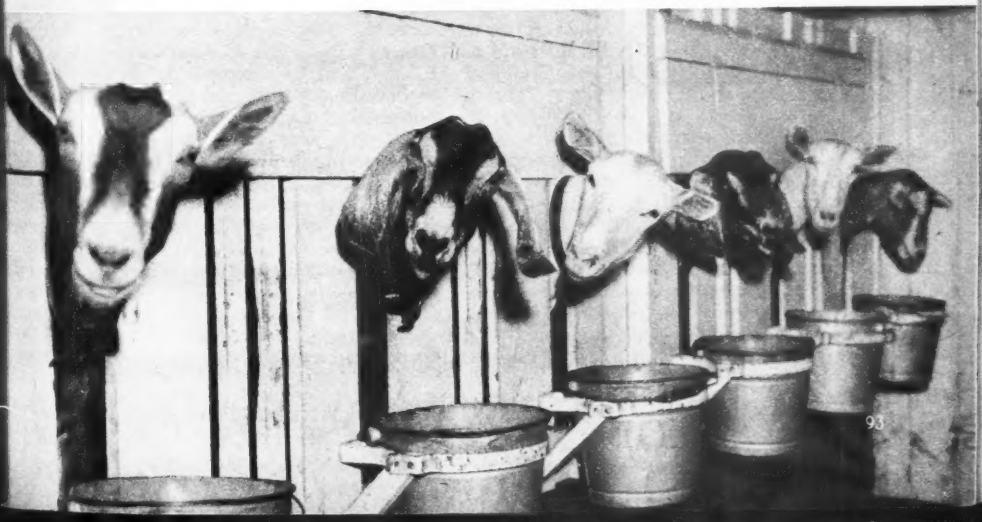
"I guess we won't need you after all. Grandpa's been down an hour and should have the tire fixed by now!"



Carl Sandburg—Pulitzer Poet

CARL Sandburg, Pulitzer Prize poet and top-ranking biographer of Abraham Lincoln, wanted milk. His wife and daughter thought a cow would be nice. But a cow did not appeal to his poetic fancy. He persuaded his family a goat would be nicer. That was 14 years ago when Sandburg got his first goat. Now he has a prize-winning herd of 80 on his farm near Hendersonville, N. C. Some of these goats give 3½ gallons of milk a day and are as notable in their line as he is in verse. •

Six of the poet's prize goats look alert in their special stalls as milking time nears.



Deathtrap, U. S. A.

[*Continued from page* 60]

summer is the most dangerous time on the farm. More farming accidents happen in July than in any other month.

4. More than half the deaths and nearly a quarter of the serious injuries result from falls.

5. The farmer's most dangerous tool is the ax, and the most dangerous animal the horse, followed by the bull and the cow.

6. The great need, the survey concludes, is for more stress on the hazards of the farm and the barnyard.

Nowhere is the tragedy of our farms brought home more grimly than at the famed Mayo Clinic in Rochester, Minnesota, in the heart of America's agricultural belt. Each week, survivors of farm accidents arrive with hands mangled in corn pickers, intestines punctured by pitchforks, spinal cords severed by falls, legs fractured by power takeoffs, necks broken by horses or bulls and bodies burned black by explosions.

It isn't always the injury that kills the victim. Often, it's what follows: gangrene, a blood clot, paralysis or a fatal infection. Peritonitis, an inflammation in the abdomen, caused the death of a 47-year-old farmer who slid down a haystack onto a pitchfork. The surgeon found nine holes in his intestines, one in his bladder and another in his liver.

The corn picker turned into a meat grinder when a 22-year-old youth reached into the picker without bothering to stop it. He managed to save his life but lost his hand.

Corn pickers and corn shredders slash off more fingers and hands than any other type of farm equipment. But the corn picker runs second to the tractor in machine accidents.

The tractor often crunches the careless farmer's life as well as his limbs. Tipping over is a major menace but a bigger danger is failure to keep the shield on the power takeoff or stop the motor when the driver steps down from his seat.

A South Dakota farmer who had driven a tractor for 20 years hooked the machine to a corn binder. The unshielded power-takeoff shaft was a little short. He made it do with an off-center hitch.

While he turned the tractor, this hitch came apart. The shaft caught his pants leg and stripped him of all his clothes except shoes and shorts. Desperately he clutched the steering wheel to keep from being dragged under. The shaft kept chewing into his leg until splinters of the shattered bone were sticking through gaping wounds in his flesh. The tractor also broke his left arm and ripped a big chunk of meat from his thigh. Still, he was lucky enough to be rescued before he finally bled to death.

Other farmers who have failed to protect themselves by using the shields on farm machines, or have removed the guards during repair work and left them off, have been less lucky. Being mangled or crushed to pulpy death is an ugly price to pay for carelessness.

Livestock accidents account for 18 per cent of the farm's victims and rank next to machinery as a hazard to the farmer. Kicking horses cause more than three times as many accidents as bulls. The bull, though, hits harder than the kicking horse and causes more deaths through goring or trampling than the horse does by kicking.

But there are other barnyard residents who spell danger to the farmer. A sow with a new litter, a vicious goat or ram are a constant threat of injury, if not death. Edward G. Heindel of York, Pennsylvania, died of injuries inflicted when a 500-pound hog attacked him. Even sheep must be handled with care. Recently a sheep crippled a 60-year-old farmer when it fell on him from the upper deck of his truck.

Not only are healthy livestock dangerous, but sick animals or dead ones are an additional hazard to farming people. For human beings are susceptible to many of the ills that ravage the animal world. Sickly livestock may expose the farmer and his family to a similar sickness.

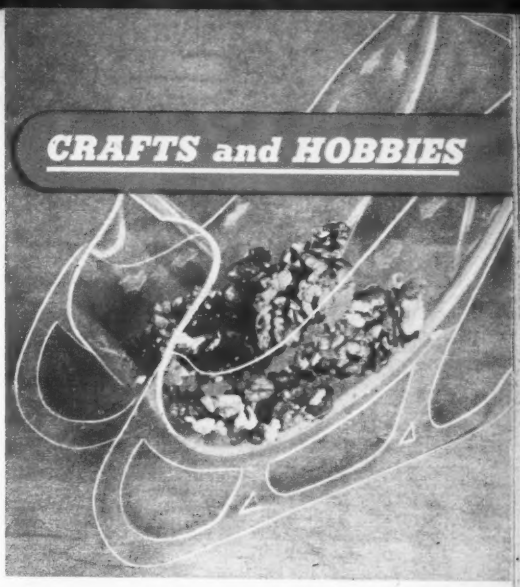
Fire is a greater calamity in the country than it is in the city, since thus far, at least, it's been impossible to organize fire-fighting units that can reach the farm promptly and quell the flames before they gut the house or level the barn.

Many farming families lose their lives as well as their homes in fires. Last year fire loss cost farmers $90,000,000.

But, even without the barn or the house going up in flames, farmers still risk death through burns. One farmer died of burns when he used kerosene to start a small fire. Others have suffered fatal burns when they filled a fuel tank over a hot tractor engine, or become severely seared when they poured hot Babbitt metal on motor bearings.

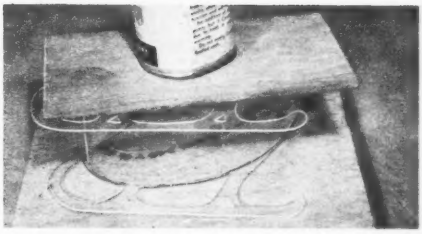
Anyone who really wants a first-hand lesson in the dire need for farm safety should take a look at the disabled patients at the Mayo Clinic—or at any other medical center in farming territory. He would vow, while he still can use his limbs and organs, to beware of those hidden rural hazards. And he would want to start a crusade to wipe Deathtrap, U. S. A., off the map and make the American farm as truly peaceful and serene as the city dweller's dream of that wonderful little "quiet place in the country." •

Christmas CANDY TRAY

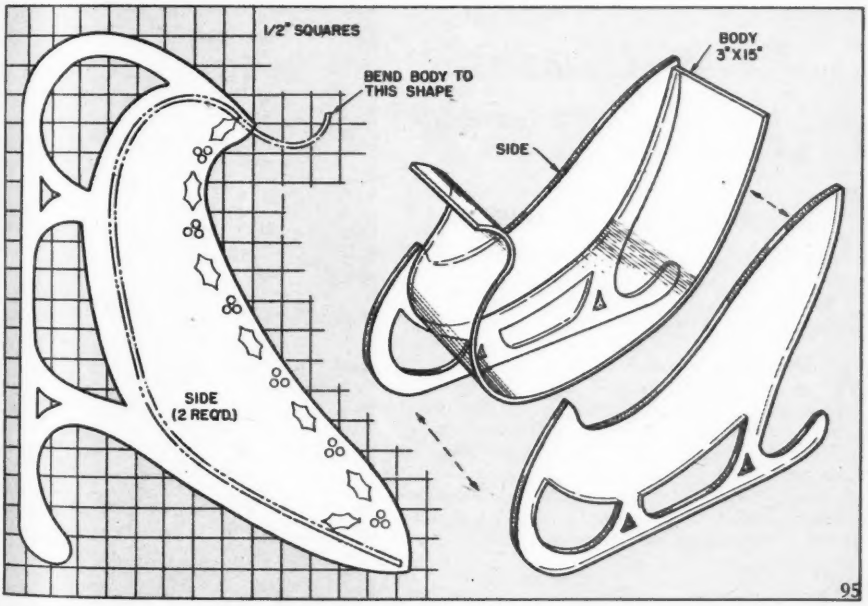


SANTA'S sleigh in miniature, made of plastic and filled with nuts, cookies, or candies, is both decorative and useful during the holidays. Using $\frac{1}{16}$-in. plastic, cut out two side pieces and one body piece. Heat the body until flexible and form around template, as shown below left, using a pair of gloves to protect your hands. Pour solvent into a flat pan, soak one edge of the body until slightly sirupy, and cement to one of the side pieces, below right. After 12 hours, repeat process with other side piece, making sure that runners are parallel to each other. •

Using the pattern below, make a bending template from scrap around which to form the plastic body.



When cementing the joints, use a can of sand for pressure and leave in place for about 12 hours.

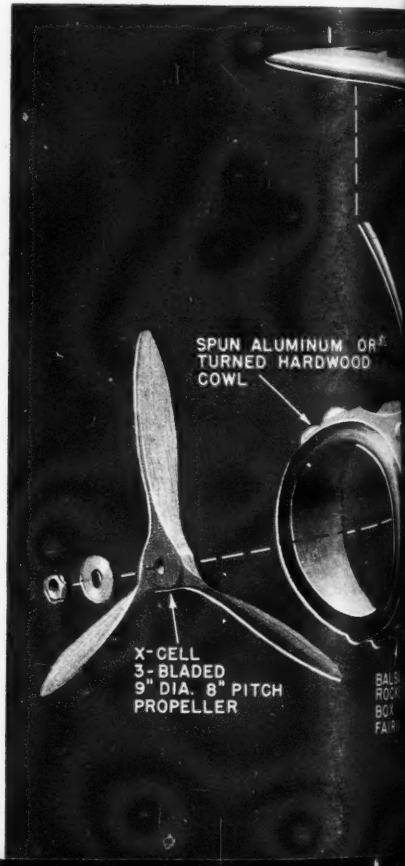


For the past twelve years Major Al Williams, left, has thrilled millions of aviation enthusiasts the world over with his famous Grumman Gulfhawk, the model of which is being held above. The fine stunting characteristics of the real plane are, logically, also contained in our scale replica.

Al Williams' GULFHAWK

Build a 30 in. scale replica of the most famous of air show performers. Power with .29 to .65 gas or diesel engines.

A brilliantly colored biplane sped at top speed only fifteen feet above the ground and suddenly zoomed up into a tight loop, then another and another until it had completed about a dozen or more! At times it seemed the plane would surely crash into the ground. The crowd of spectators were silenced with suspense, then let out a mighty cheer as the ship leveled off. On its return trip the neat



By Walter Musciano

Photos by Mike Bonvino

little biplane whizzed along the entire 6,000 foot runway in a 90 degree vertical bank with the wingtips a bare ten feet above the concrete! No person in the crowd could deny that both plane and pilot were tops!

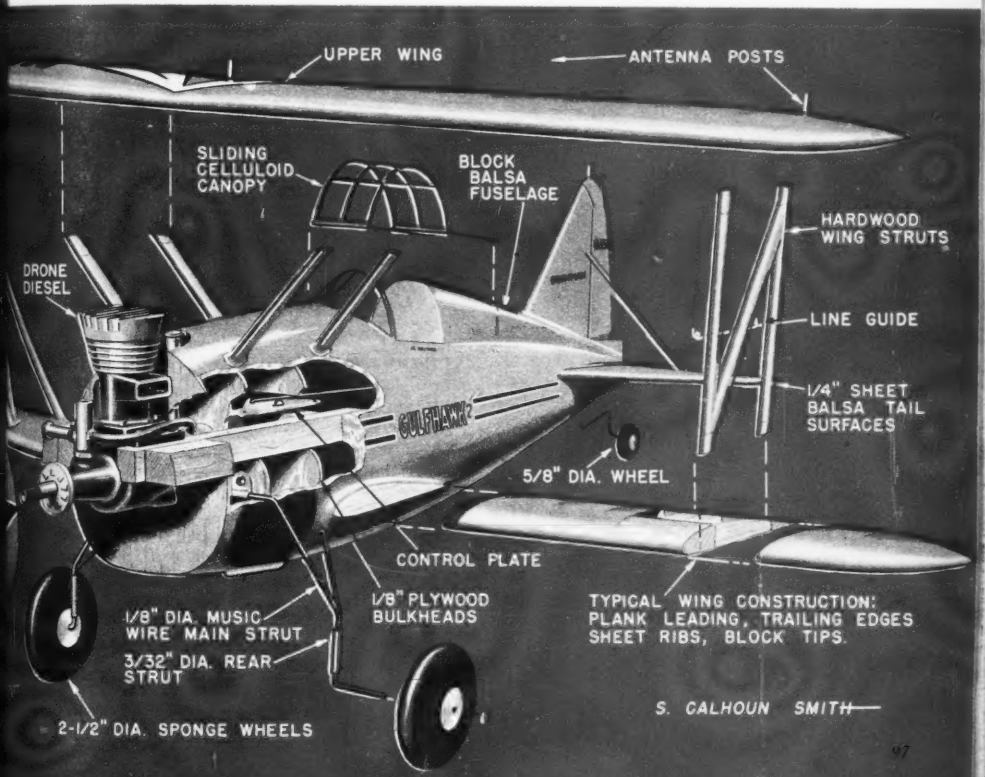
You guessed it. It was Major Al Williams at the controls of his famous Gulfhawk. Major Williams, of Pulitzer Trophy Race fame, has thrilled millions for over ten years with his daring and skillful maneuvers. The plane was selected by Al Williams, sponsored by the Gulf Oil Company of which he is an executive and built by the Grumman Engineering Company. Known as model G-22, the design is an adaption of the Marine Corps' F3F-2 fighter. A 1000 h.p. Wright "Cyclone" G-1 drives the plane at a speed of 290 m.p.h. and the rate of climb is 3,500 ft. per min. The craft is rigidly braced to withstand power dives and violent maneuvers. It was the last of the U. S. Navy's biplane fighters.

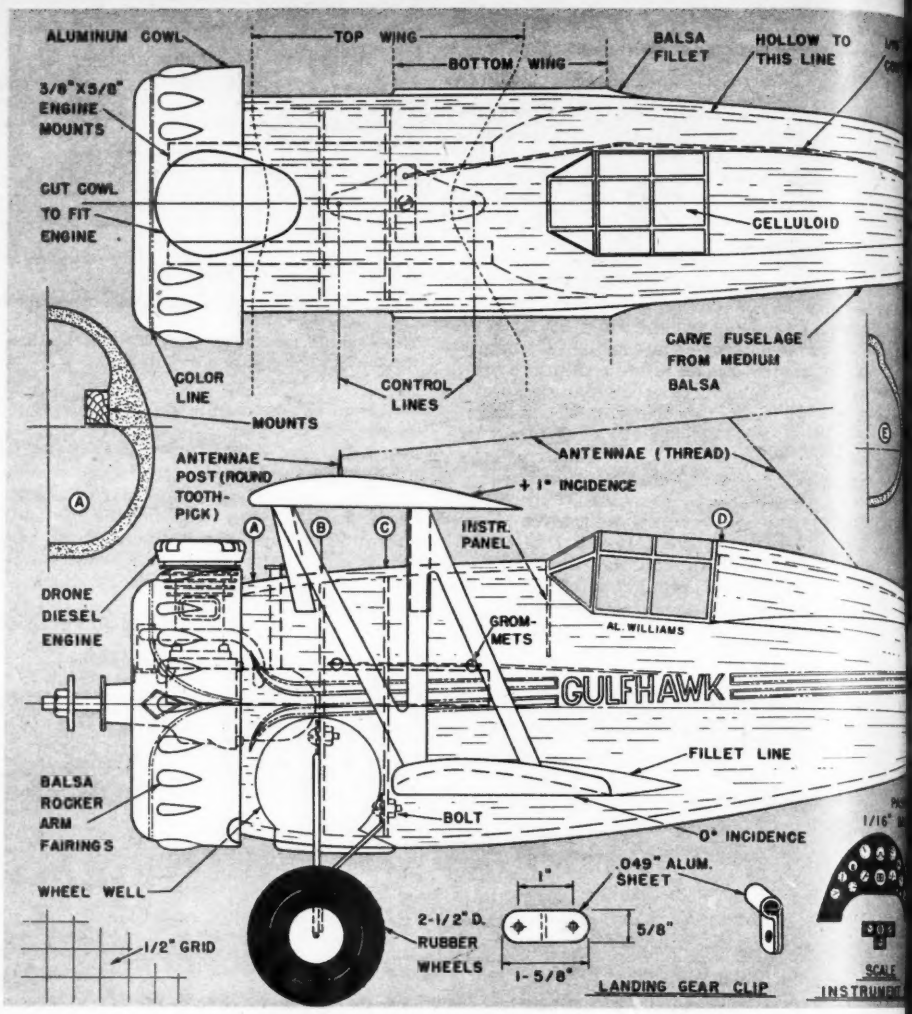
Its colorful all orange paint job with white and blue striping and sunbeam design produces an attractive sport model

Three-quarter rear view. If you desire stunting, use the N.A.C.A. .0012 airfoil, as shown on plans.

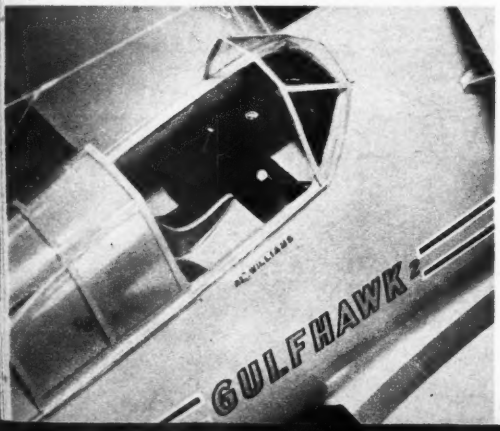
potential beauty event winner. The symmetrical airfoil and concentrated wing area result in a fine stunt plane when fitted with a stunt tank. Construction could not be simpler. The fuselage is carved from a balsa block and the wings employ a heavy leading and trailing edge with no spars. The tail is solid balsa sheet. The scale is one inch to the foot which brings the wing area to 230 sq. in.

Select two straight grained medium balsa

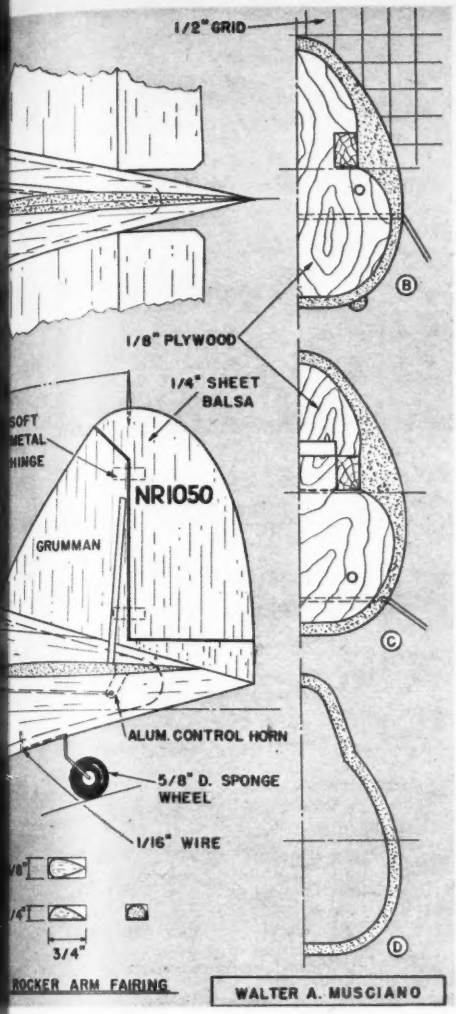




Close-up view showing cockpit details, which are optional. Canopy slides back. Note seat, stick and throttle. Gulfhawk insignia is traced from full size plans on fuselage side then doped black.



blocks sizes 3x4x20 in. and cement lightly along the horizontal center line. Trace the fuselage plan view and cut the outlines to shape with a coping saw. Consult the sketches on fuselage construction. Repeat this procedure for the side view. Now, using a sharp carving knife or plane, shape the fuselage to the cross-sections shown on the plans. Sand until smooth and apply two coats of clear dope. Pry the two halves apart and hollow to the thickness indicated, using an X-acto or similar gouge. Cut the plywood bulkheads and cement in place on the lower fuselage shell. Bend the landing gear struts and attach to the bulkheads with metal clips and bolts as shown. The engine mounts are now installed, using a

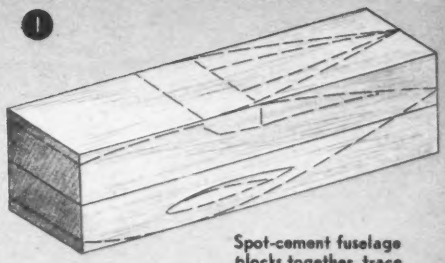


casein glue as an adhesive. The location of the mounts will depend on the engine used. A diesel or a glow-plug installation is recommended because it not only saves weight but eliminates ignition worries as well. Engines from .29 to .60 cu. in. displacement can be used effectively. Install the bellcrank support between the mounts and then bolt the bellcrank in place.

The wings are made in four separate panels. The upper panels are made by pinning the leading and trailing edges directly over the plans and then inserting the rib stock on which the airfoil should be traced. Remember, if you desire stunting (loops, inverted flying, etc.), use the N.A.C.A. .0012 airfoil. If ordinary leveling

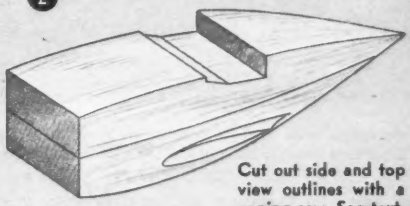
FUSELAGE CONSTRUCTION

1



Spot-cement fuselage blocks together, trace top and side outlines.

2

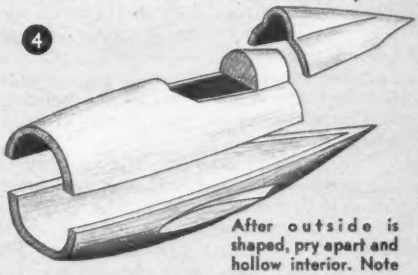


Cut out side and top view outlines with a coping saw. See text.

3

Carve the exterior to shape, check against the cross-section views on the plans.

4



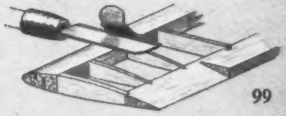
After outside is shaped, pry apart and hollow interior. Note fillet for lower wing.

WING CONSTRUCTION

1

Build the wing over the full size plans. Cut the rectangular rib material and cement in place between edges as shown. Then carve the rib to shape.

2



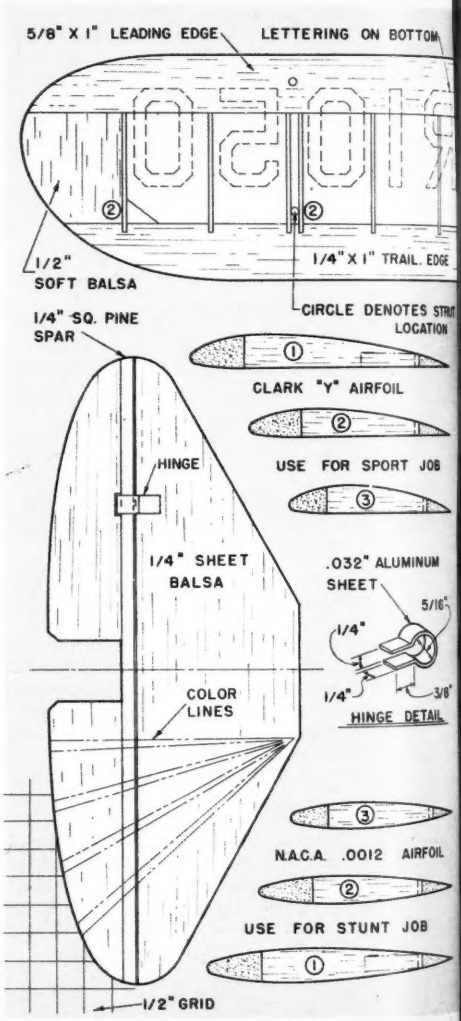
Complete with radio antennae and ready to go! Rudder is offset to the right to counteract the torque.

flying and zooming will satisfy you, then use the Clark Y airfoil. Pin the ribs in place between the leading and trailing edges and after the cement has dried, remove the panel and carve both the edges, ribs and tip to shape. Since only one half of the wing is shown trace the outline through the plan and use the back side for making the remaining panel. This same procedure is used when building the lower wing panels.

Make the stabilizer from ¼ in. sheet and cement to the upper fuselage shell. When dry, cut the upper shell apart, attach the control rod to the elevator horn and cement the rear portion of the upper fuselage half to the lower half permanently. Connect the control rod to the bellcrank and attach the upper forward half. The tailwheel is now added.

The original model had Silkspan covered wings but $\frac{1}{32}$ in. sheet balsa can be substituted if desired. The structure should be well sanded before the covering is applied in order to obtain a smooth surface. Five coats of clear dope will prepare the covering for the colored dope. Remember to leave slots for the pine struts uncovered.

A good grade of wood filler should be applied to the fuselage and empennage with intermittent sandings with fine wet sandpaper until a smooth surface has been obtained. Cement the fin in place and attach the rudder to it, using thin aluminum sheet. The lower wing can now be cemented in place at the dihedral angle indicated on the plans. It is suggested that the model be painted before the upper wing is assembled. Four coats of dope should produce a fine finish if a rubbing compound is used between each coat. In the event that an alcohol or "hot fuel" is used, a coat of



Testors' fuel-resistant dope should be applied when the plane is completely finished. The engine mounts and cowl interior should also be treated with this solution.

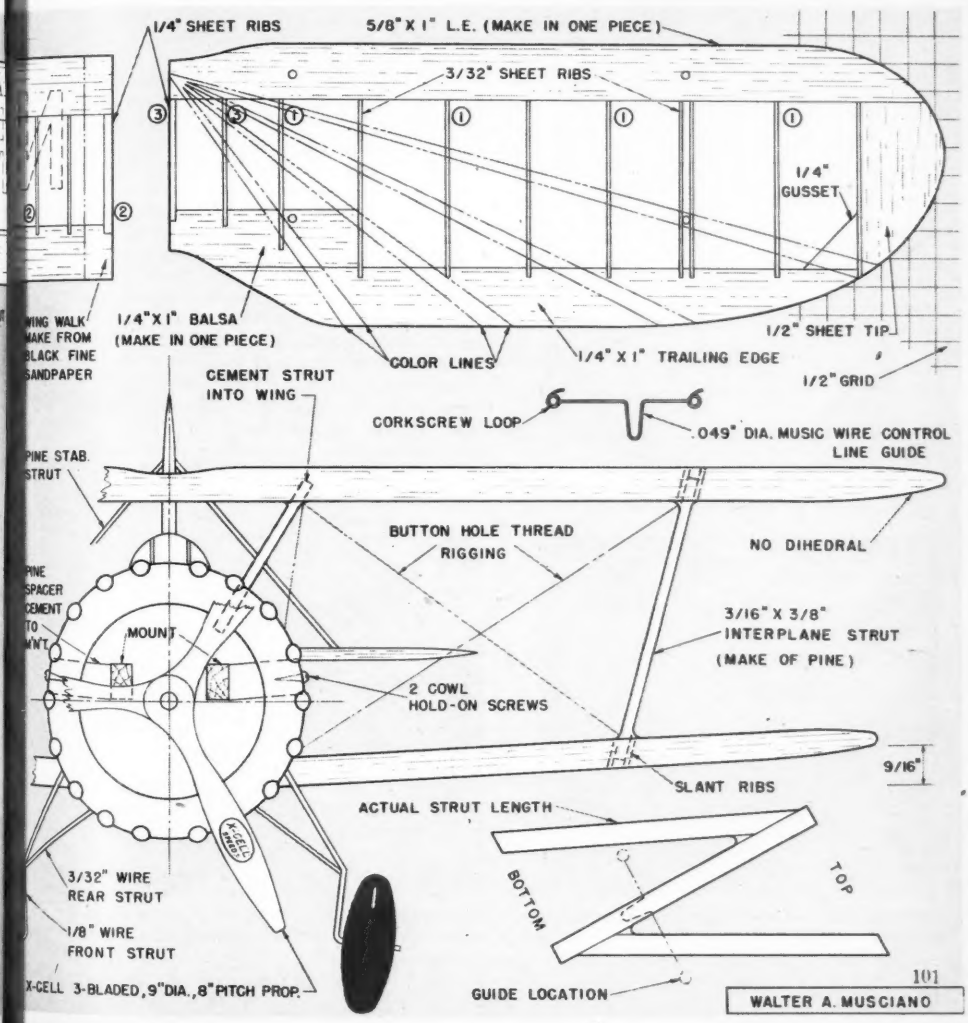
The struts are cut from pine or other hardwood and sanded to a streamline cross-section. These are painted aluminum and rubbed to resemble a metal surface. When completed, they are securely cemented to the lower wing and fuselage. Then the upper wing is cemented permanently in place.

An aluminum cowl which fits the model can be purchased from your local hobby shop. Cowl blisters are cut from balsa and cemented and faired in place. The cowl is held in place with four wood screws. An X-Cell three bladed 9 in. dia., 8 in. pitch propeller was used in order to maintain the scale appearance. These propellers proved quite effective in test flights. A complete scale cockpit interior and sliding cockpit hatch will accumulate extra points at a beauty contest. The plans include a scale instrument panel.

If this is your first attempt at a model airplane, it is [*Continued on page* 132]

FULL SIZE PLANS

of this model will greatly simplify construction. Send 50c to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 396



Platform Rocker

Modernized version of old favorite provides luxury and comfort galore.

By Benjamin Nielsen

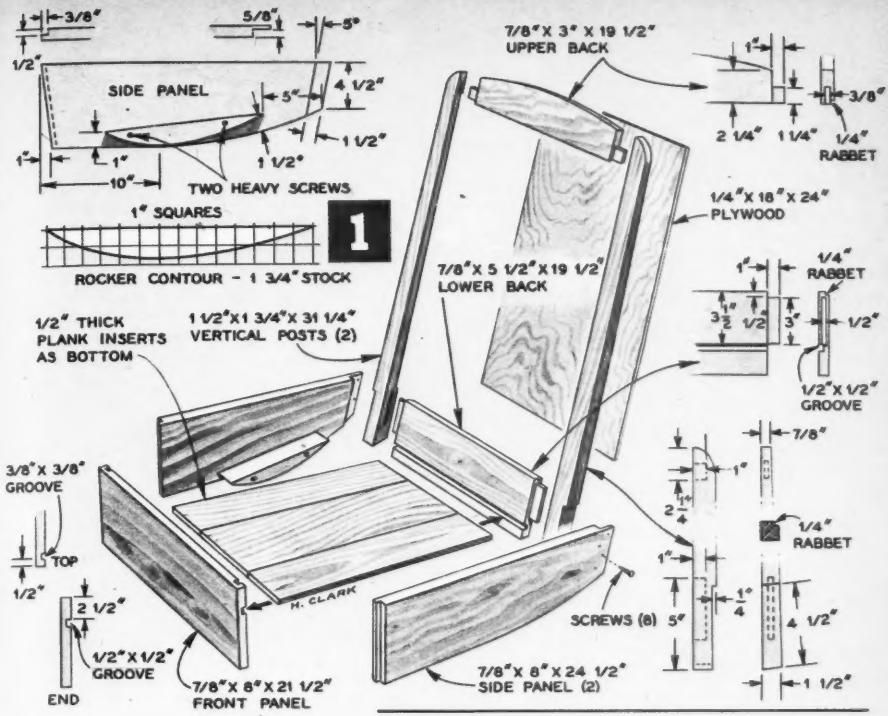
THE old platform rocker is making a comeback—proving the adage that beauty is more than skin deep. A novel feature in the construction of this chair is the use of a knee-action spring from an automobile, which gives it friction-free, velvety smooth rocking action. Fig. 4 explains its installation and function. Choice-grained walnut is used for the exposed arm uprights and platform. For those pieces covered by upholstery, second-grade walnut is used. Construction of all parts is clearly shown in the drawings. Thoroughly sand exposed parts and apply two coats of thinned shellac, rubbing down between coats with fine steel wool. Standard pocketed springs and sponge rubber are used for upholstery. The buttons are fabric covered and tied in postition before the back material is tacked on. •

Standard pocketed springs of the type shown are obtainable at any upholstery supply house.

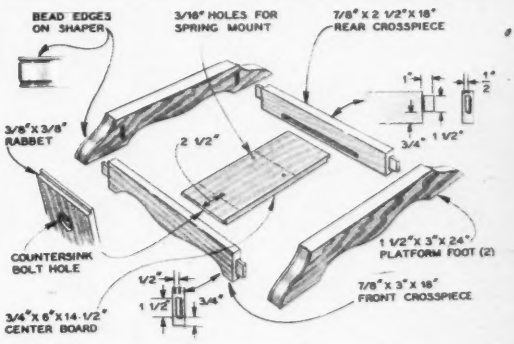
Gilt-head tacks are used to secure the back length of fabric material tightly in the proper position.

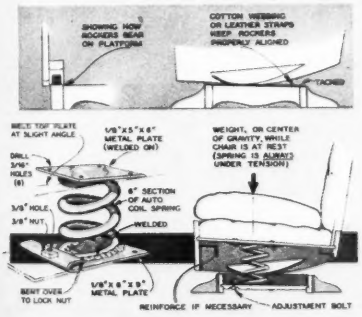
An integral part of the spring is a bolt for making adjustment to limit arc through which you can rock.

1

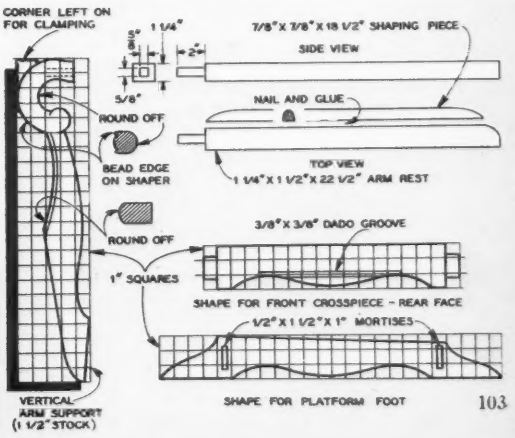


2



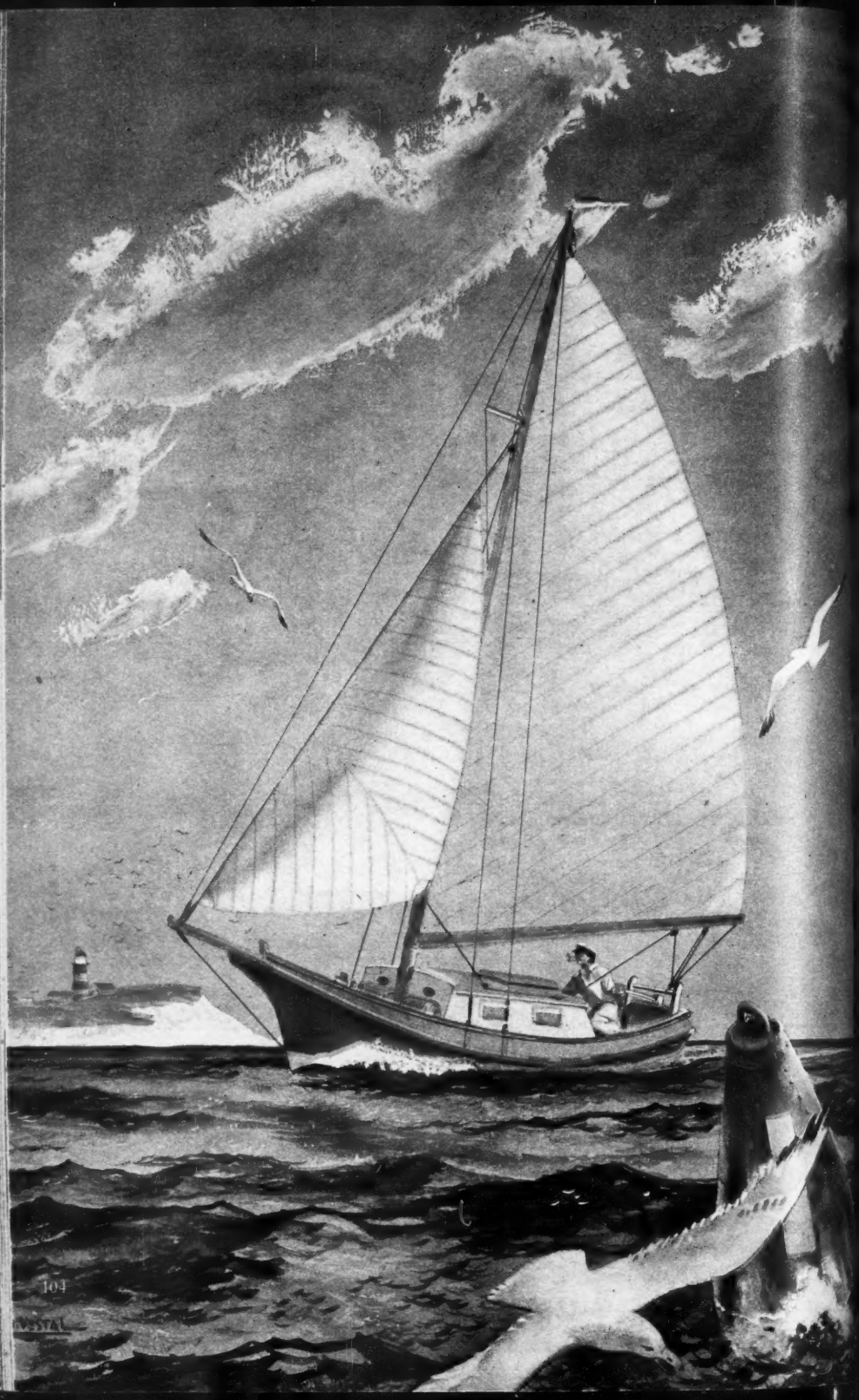


4



3

You can obtain the knee-action spring in any garage scrap pile or auto junk yard.



building FLYING DUTCHMAN

By Gerald Taylor White

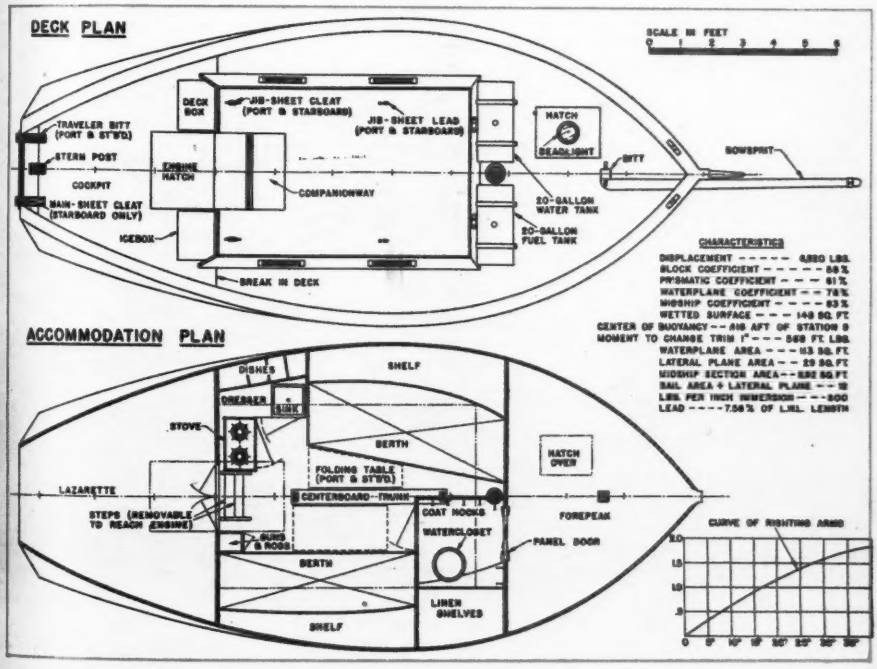
Design by Westlawn Associates, Naval Architects

IF FLYING DUTCHMAN were a new and untried type of boat, you would be entitled to look at her plans and remark, "She looks wonderful on paper, but it is all too good to be true." For where else can you find a boat of this length that has a huge forecastle, an enclosed toilet room, a good galley, and two full-length berths, to say nothing of as much deck room as on the average 30-footer?

FLYING DUTCHMAN is the latest of the GREY DAWN designs. The basic hull lines were developed in Holland centuries ago and boats of this type have been used ever since in both the shoal waters of the Zuyder Zee and the vicious waters of the North Sea. The first of these Dutchmen to be designed in this country was GREY DAWN II. She was built over 20 years ago and is still afloat. During her two-score-and-more years she has cruised the East Coast from Maine to the Carribbean, and her owner would have sailed her across to Europe had it not been for the war. She is a 37-footer. Scores of duplicates have been built and are now in service on both coasts, the Gulf, and the Great Lakes.

Yachtsmen who saw the 37-footer wanted a smaller edition; so a 29-footer was designed. Again the boat out-performed all expectations. The next was a 22-footer, the prototype of FLYING DUTCHMAN. In this, the most recent of the designs, the original lines have been kept without a single deviation—wise men do not gamble with perfection. Some changes, based on previous experiences, have been made in the deck and cabin arrangements.

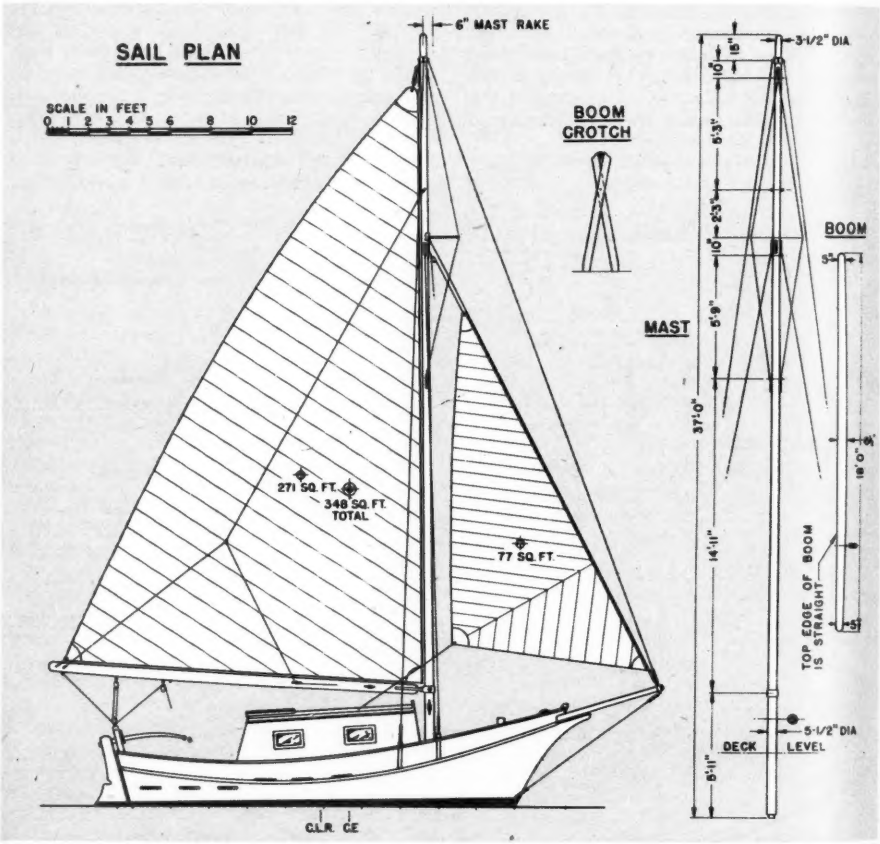
Here is an auxiliary that—for a boat of her size—is extremely easy to build. There



are no steam-bent frames, no cross-bending of parts. Some of the planks and the chines and clamps will be too stiff to go in cold. Wrap them with old rags or sacking and provide a supply of boiling water to be poured on the rags as the clamp screws are gradually tightened. She isn't a light little plaything, she is all boat; and, if built according to the plans and specifications, should last for at least 25 years.

All of you may not be technically inclined, but to really appreciate the virtues of the boat, it may be worthwhile to consider for a few minutes some of the mathematical aspects of the design. Unlike most boats, her center of buoyancy is closer to the midship section than to the next station aft. This is an ideal situation if the entire underbody can be properly balanced. If you will look at the drawing entitled Lines and Offsets, you will see a dotted line marked Curve of Areas. The shape of that line indicates the path of the water around and under the hull. Note that the forward and after ends of that curve are almost identical. In a motorboat, that would be fatal to speed; in a sailing craft, it is ideal from both the speed and rough-water angles.

If the lines of FLYING DUTCHMAN could be compared with any American type, it would be the Down-East dory. But the dory is known for its lack of stability, while the GREY DAWN type is famed for exactly the opposite. The answer lies in the way the hull is balanced. Look at the Curve of Righting Arms on the Accommodation Plan. It represents the inherent power in the hull that causes it to return to an even keel. Many sailing boats have a curve that reaches its peak at about 30° and then falls off sharply. You will note that the stabilizing effect of this hull shape is still going upwards at even 40°. At any such angle, the deck edge would be 'way



Sister ships of "FLYING DUTCHMAN" have been built in all lengths from 16 to 37 ft. Here is "MITE," a 16-footer from Skagway, Alaska.

under water. In other words, a careless skipper could actually sail the boat under water but she would still be struggling to right herself.

In rough water, her widely flaring sides lift her up and over the seas instead of plunging through them. It would be severe weather indeed to cause this boat to drive her bow under. This is what designers call abnormally high reserve buoyancy. She is at her best with the wind abeam or slightly forward or aft of that point. Going to windward, she will point up surprisingly well—as a stunt, a sister ship was sailed dead to windward, tacking up a channel 100 ft. in width—but her worst point of sailing is going dead before the wind, especially when running into rough water. Her bows are a bit bluff for this sort of work; so she will carry a heavy bow wave. The wise skipper will soon learn this and won't sail a direct downwind course.

The power plant shown is a Universal 8-hp. Fisherman. Any small engine of about the same power will do providing that it doesn't turn over 1,500 r.p.m. Don't expect a little high-speed engine, turning a 10-in. propeller, to be sufficient. It is not the amount of power, but the combination of power and relatively low revolutions. If you must get a high-speed engine, it will have to have a reduction gear, for FLYING DUTCHMAN needs a propeller at least 14 in. in diameter, and 16 in. would be better yet. Like many successful auxiliaries, the engine is installed so the propeller is off center. Thus the natural tendency of a boat to be thrown off her course due to wheel torque is counteracted. This would not apply to the average motorboat as the area of lateral plane is much less and you would have steering troubles.

Make up your mind to one thing before you build her—that you will not change a single line. Years of experience went into her design. The construction, shapes, locations of weights, and all other factors are correct the way they are shown. If you attempt to change any measurements, alter the rig, or monkey with weights, the result will probably be a total waste of your time and money.

FLYING DUTCHMAN is timed-tried, comfortable, reasonably fast, and built to last many, many years. Can you ask for more in any boat?

SPECIFICATIONS

Length Over All	22 ft.	0	in.
Length Waterline	18 ft.	9	in.
Beam, Extreme	9 ft.	5½	in.
Beam, Waterline	7 ft.	9	in.
Draft, Board Up		20½	in.
Draft, Board Down	4 ft.	0	in.

General. The objects of these specifications are to help in explaining the drawings and to specify certain materials and sizes. In every case, dimensions mentioned in these specifications should be considered as authentic, even if the plans do not scale the same exact size. Lettered dimensions on the drawings should be taken in preference to scaling.

Laying Down. To insure accuracy, it is highly advisable to lay down the set of lines full size on the shop floor. This is because a variation of only the thickness of a line on the drawing will make a difference in the full-size boat. Only when it is impossible to obtain a smooth, level floor upon which the lines may be laid down should the frames be made directly from the Table of Offsets. Note that the offsets extend to the outside of the planking and the decking and that the frames fit to the inside of planking and decking; therefore the thickness of planking and decking must be deducted when the frames are made.

Keel. White oak, 4 in. thick, built as shown in detail drawing. Note that to save lumber there is a piece of triangular deadwood aft and a similar piece forward. The keel is slotted for the centerboard from a point 7 in. forward of Station 4 to a point 1 in. abaft Station 7. This slot is 1½ in. wide. The fastenings for the keel and its parts are ⅜-in. through or drift bolts, as indicated on the drawing. The surfaces of all joints must be well covered with non-

hardening marine glue or white lead before being drawn together.

Stem. White oak, sided 4 in., molded 6 in., arranged as shown and extended far enough above the rail line so it can be finished off with the ornamental curve. Below the clipper stem it is faced off to a width of ¾ in., but in way of the clipper stem, facing off should be left until that piece is in place. The entire stem is rabbetted for the planking.

Clipper Stem. White oak, preferably a grown knee, 2½ in. thick where it joins the stem and tapered to 1¼ in. thick at the forward upper point and, gradually, to ¾ in. thick at the forward lower point.

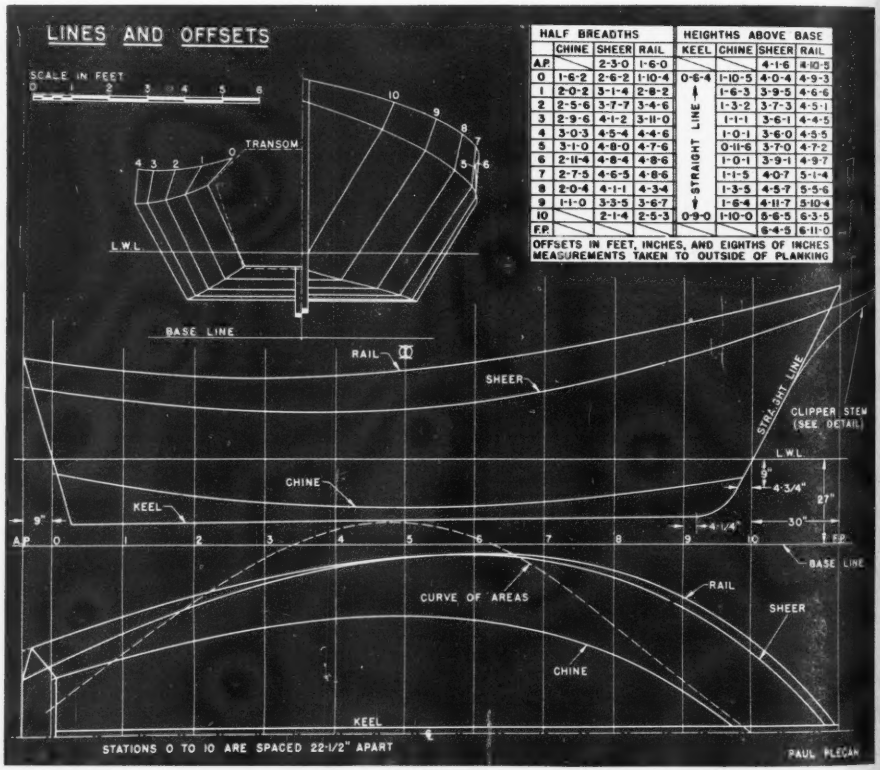
Stem Knee. White oak, sided 3 in. and molded about as shown. You can get slightly more room in the forepeak and use shorter bolts if you curve the upper portion of the stem knee, although it involves more work.

Stern Post. White oak, sided 4 in., molded 4 in., and notched for the 1¼-in. transom.

Stopwaters. Half-inch white-pine stopwaters are driven where indicated, there being two forward and one just forward of Station 2.

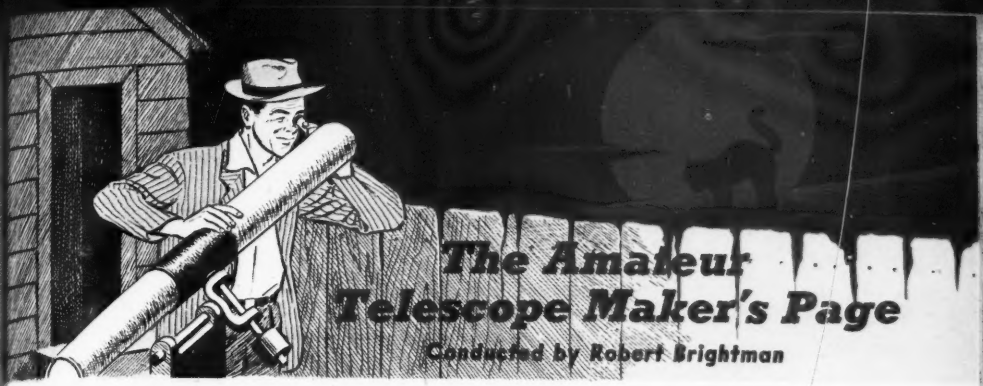
Transom. White oak, 1¼ in. thick, in as wide boards as possible. If made of marine plywood, it can be 1 in. thick. Note that the notch in the stern post must be the same thickness as the transom. If made of boards, the seams run horizontally and are backed by ⅞x2-in. screw-fastened cleats. The forward face of the transom is finished off with ⅞x2-in. white-oak screw-fastened cleats to form an extra backing for the planking. If a plywood stern is used, the cleats should be flush with the edges of the transom. An alternative method when the transom is made of oak boards is to have the cleats 1¼ in. thick and to set them in the thickness of the planking from the edges of the transom. In this case, the plank ends butt against the transom and great care must be taken to apply plenty of marine glue between the cleats and the transom.

[*Continued on page* 128]



	HALF BREADTHS			HEIGHTS ABOVE BASE			
	CHINE	SHEER	RAIL	KEEL	CHINE	SHEER	RAIL
A.P.		2-3-0	1-6-0			4-1-6	4-10-5
0	1-6-2	2-6-2	1-10-4	0-6-4	1-10-5	4-0-4	4-9-3
1	2-0-2	3-1-4	2-8-2		1-6-3	3-9-5	4-6-6
2	2-5-6	3-7-7	3-4-6		1-3-2	3-7-3	4-5-1
3	2-9-6	4-1-2	3-11-0		1-1-1	3-6-1	4-4-5
4	3-0-3	4-5-4	4-4-6		1-0-1	3-6-0	4-5-5
5	3-1-0	4-8-0	4-7-6		0-11-6	3-7-0	4-7-2
6	2-11-4	4-8-4	4-8-6		1-0-1	3-9-1	4-9-7
7	2-7-5	4-6-5	4-8-6		1-1-5	4-0-7	5-1-4
8	2-0-4	4-1-1	4-3-4		1-3-5	4-5-7	5-5-6
9	1-1-0	3-3-5	3-6-7		1-6-4	4-11-7	5-10-4
10		2-1-4	2-5-3	0-9-0	1-10-0	5-6-5	6-3-5
F.P.						6-4-5	6-11-0

OFFSETS IN FEET, INCHES, AND EIGHTHS OF INCHES
MEASUREMENTS TAKEN TO OUTSIDE OF PLANKING



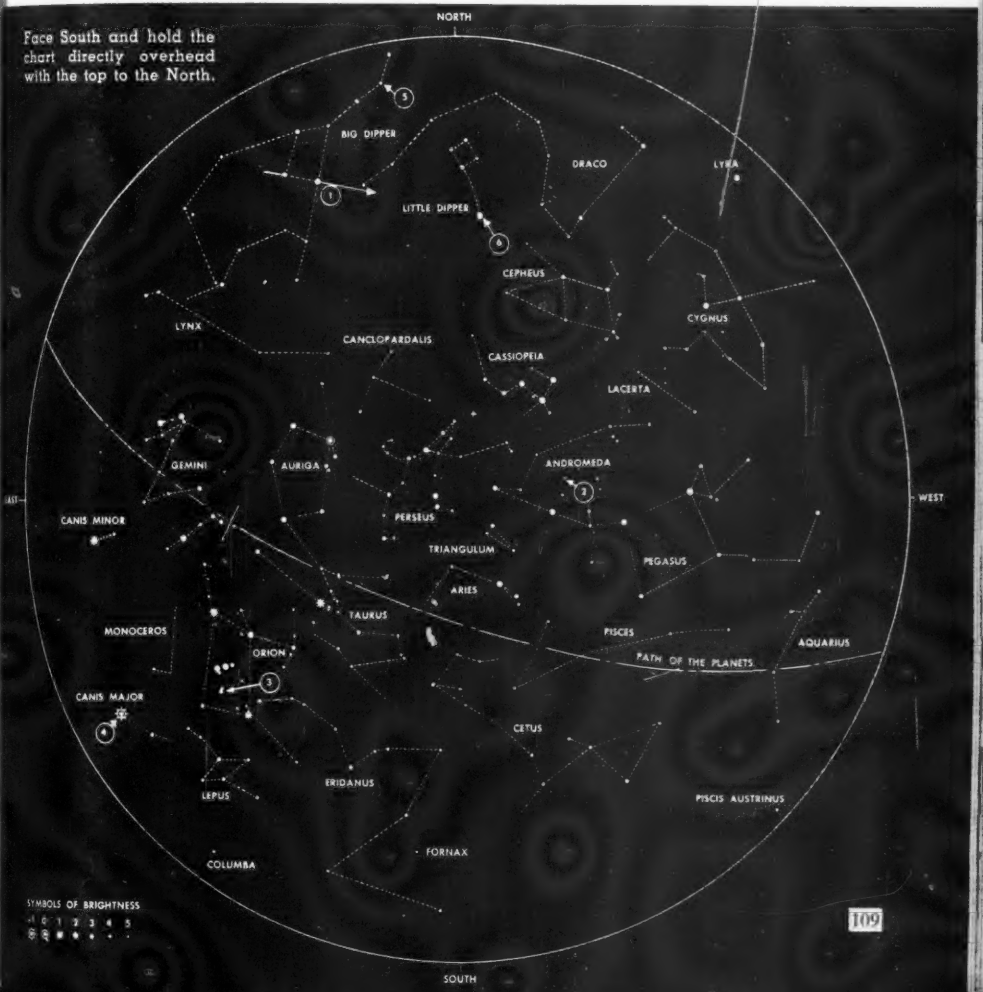
The Amateur Telescope Maker's Page

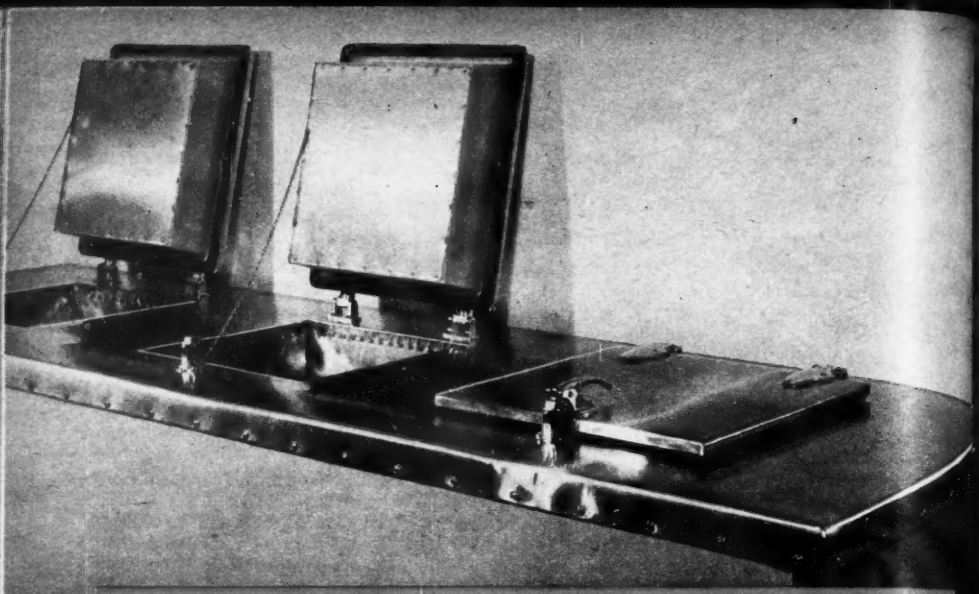
Conducted by Robert Brightman

THE winter skies are especially rich in astronomical sights. Many of them are easily visible with the naked eye. Only with a telescope, however, can you fully realize their awe-inspiring grandeur.

The most prominent constellation at this time of the year is Orion. The star indicated by arrow No. 3 is in the midst of a great nebula. This causes this particular star to appear slightly misty to the naked eye. Train your telescope on it.

Another nebula is in the constellation of Andromeda, arrow No. 2. This is the brightest of the spiral nebulae. It takes light 700,000 years to reach us from this point. If you can [*Continued on page* 138]





Home Deep Freezer

PART II

By John P. Arnold

LAST month we completed all the woodworking, but assembly was deferred until the refrigerating-coil plates were made. These, together with the rest of the cooling system, are shown in Fig. 10. About 60 ft. of soft, seamless ½-in. copper tubing is laid out in flat, evenly spaced coils on two sheets of galvanized metal; then soldered to these plates with strips of sheet metal. Leave 18 in. of tubing extending at the ends to make the necessary connections. For those who want to simplify the job as much as they can, it is possible to obtain this tubing in sealed, dehydrated coils, designed especially for refrigerating work. The coil plates are placed in the tank with the tubing between plates and tank sides. Sheet-metal screws are used to secure the plates. Be sure that the lowest of these screws are at least 4 in. above the bottom of the tank.

As it will be necessary to have a service man charge the system with freon or methyl chloride and put the freezer in operation, you may prefer to have him make the few mechanical connections while he is on the job. His charge for this will be nominal and he'll have the necessary tools and fittings right there. All of these connections can be made through the hatches after the top is installed; so the box can now be moved to the room where it is to be used.

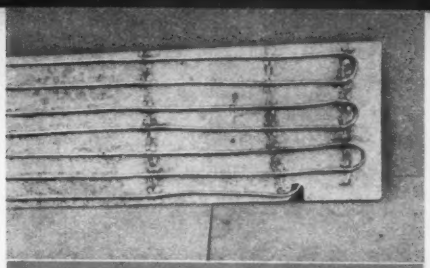
In fitting the top to the body, ordinary plastic compound is laid with a caulking gun in a continuous ribbon around the ledge formed by the strips nailed to the top of the tank. The top is placed squarely on this. It is important that a complete seal be effected, that the side insulation be high enough so it is slightly compressed when the top is installed, and that the sheet metal on the underside of the top extend beyond the edges of the tank, but not beyond the wooden strips and so into the insulation (Fig. 2).

Next comes the metal covering (Fig. 11). Before fitting it, line the sides of the hatches with galvanized sheet metal, as shown in Fig. 12. For the top itself, stainless steel makes an expensively handsome job, but painted galvanized metal is sufficiently goodlooking and extremely serviceable. Careful fitting and soldering are required.

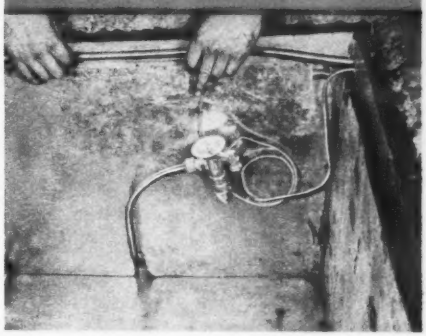
The most practical method of holding the sheet flat is to run two-by-fours up to the ceiling and wedge them in place; then cut out the hatch openings with tin snips, turn the 1-in. flaps down, and nail them to the sides of the openings. The edges of the sheet are folded under, cut away at the corners, and slitted to fit. To make smooth-fitting corners, use solder. To fasten the metal around the sides of the body, employ oval-head screws with cup washers, spacing them on 4-in. centers.

To reinforce and finish off the vertical edges of the box, use 2x2-in. angle bars, bending them from flat stock and securing them with screws. The freezer is now ready for painting. Two coats of battleship-gray deck enamel, preferably sprayed on, will be sufficient. After the paint has dried, fit the hardware, install sash-chain door checks to prevent the lids from opening too far, and nail rubber gasket molding around the lids.

Now you're ready to set up the refrigerating unit and complete the preliminary work involved in installing it up to the point where the service man must take



Above is one of the two coil plates that are installed in the freezer. The coils are joined by a standard ½-in. coupling. Below is expansion valve installed in the freezer.



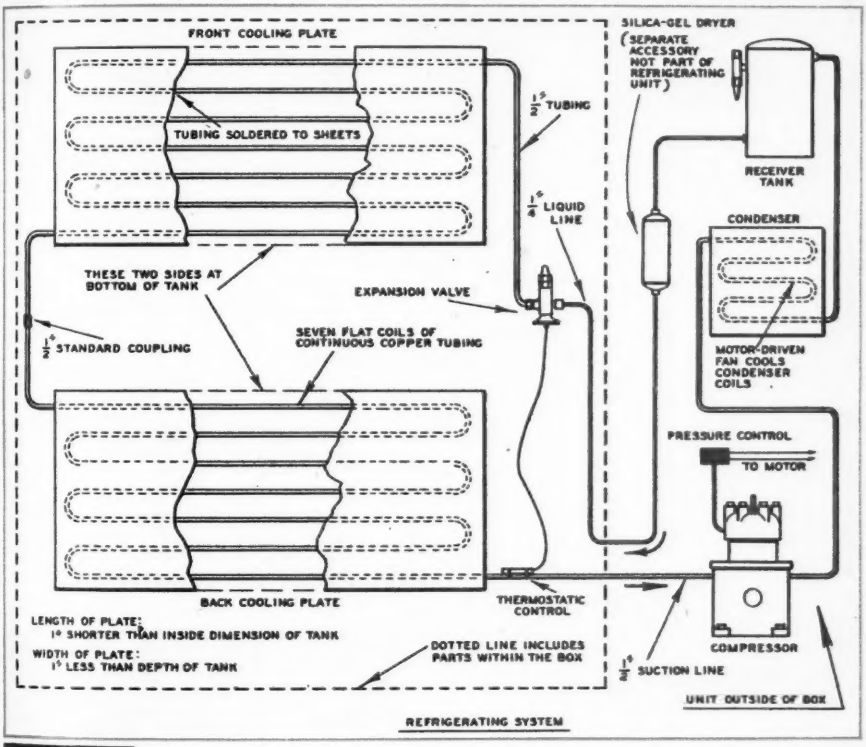
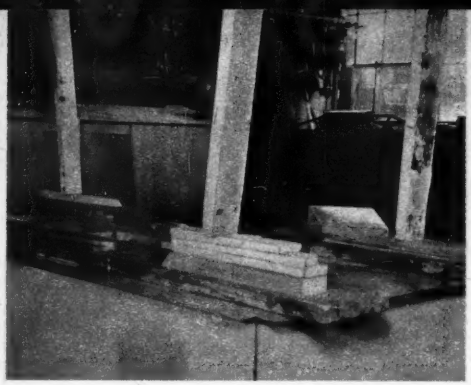
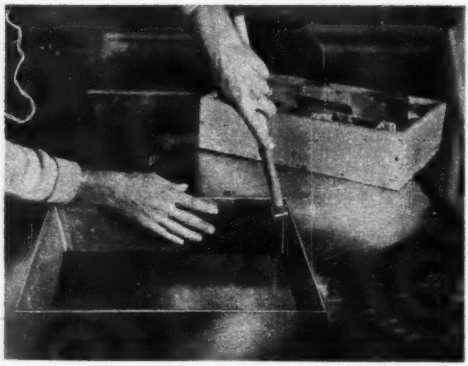


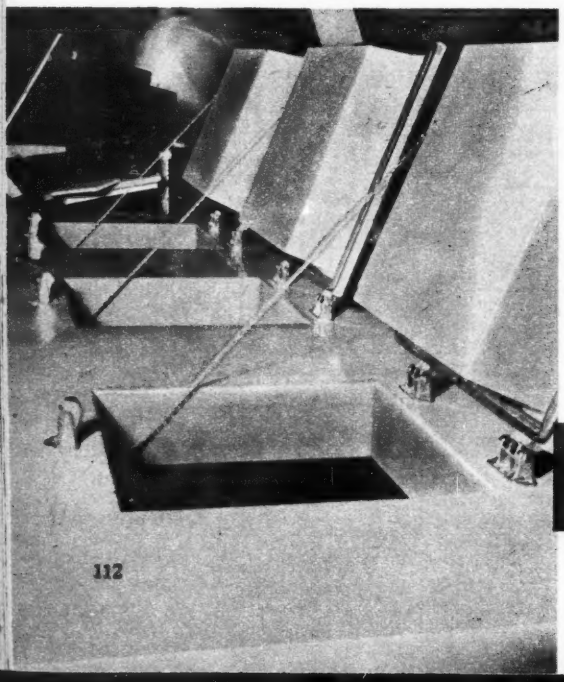
FIGURE 10



Wedged two-by-four braces extending to the ceiling hold the sheet-metal top securely in position while cutting, fitting, and securing to sides and hatches.



To do a professional-appearing, neat job around the hatches, take your time, cut and fit carefully, and hammer the nails in the flaps evenly and precisely.



All hatch fittings show clearly at left. Sash-chain stops prevent lids from opening too far. Rubber gaskets are nailed to tops.

over. First, a word about the unit and how it operates. It is usually dehydrated and sealed at the factory. There are but two connections—a ½-in. suction line and a ¼-in. liquid line. Between the suction line and the liquid line are a compressor, a condenser, and a receiving tank. When the motor is switched on, the compressor begins the refrigerating cycle. It pulls vaporized refrigerant through the suction line and, in conjunction with the condenser, reconverts it to a liquid, which is stored in the receiving tank. The liquid line runs between this tank and the freezer and has a silica-gel dryer and an expansion valve spliced into it. The dryer removes the moisture of condensation. The expansion valve is usually set to operate at a maximum of 15-lbs. pressure and is controlled by a thermostatic bulb clamped to the suction line near the point where the tubing leaves the freezer, as shown in Fig. 10. As the temperature rises in the freezer, the refrigerant in the coils vaporizes, thus extracting heat from the compartment. The temperature-controlled device on the compressor starts the motor when the temperature in the freezer rises above a predetermined point. This device should be of the pressure type rather than the temperature type.

Prepare a firm foundation to prevent annoying vibrations and bolt the unit to it. Next, run a direct-service line from the household switch-and-fuse board to a new fuse box and switch located near the unit. The fractional-horsepower motor used to drive the unit should, because of the considerable starting load encountered, be of the heavy-duty repulsion-induction type.

To take the two refrigerating lines from the unit, drill a 1-in. hole through the freezer wall into the tank. Line this with a short length of ¾-in. copper tubing. Solder the inner end of the tubing to the inside of the galvanized tank. The outer end is slightly flared over the asbestos board for a neat finish. The two refrigerating lines will pass through this easily

and should be packed in place with insulation to fill the ¾-in. tube. This lead-in hole should be kept well above the bottom of the tank. When the refrigerating unit is placed close to the freezer, it is convenient to leave enough tubing to reach the unit without a break. When the unit is placed some distance away, the lines need only extend about 12 in. outside the box and can then be joined by couplings to the additional lengths required to reach the unit.

This completes your work. Call in the service man to make the final connections, to blow out and charge the system, and to test it under pressure.

Once the box is in operation and the temperature lowered, properly prepared food may be stored in it. Defrosting is necessary once or twice a year, but is a simple operation: turn off the current and remove the stored food; the ice will melt and can be either sponged or siphoned out.

Many persons fear the consequences of electrical breakdowns. Don't worry—in a well-insulated box, foodstuffs will remain in good condition for at least 48 hours after power interruption and such interruptions rarely endure longer than this.

For a free list of manufacturers of parts used in this freezer, write your request on a postcard and mail to MECHANIX ILLUSTRATED, 67 W. 44th St., New York 18, N. Y. •

LARGE - SCALE PLANS

will greatly simplify construction. Send $3 to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify plan No. HJ-15.

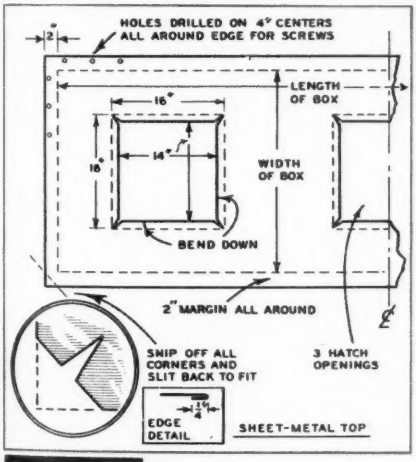
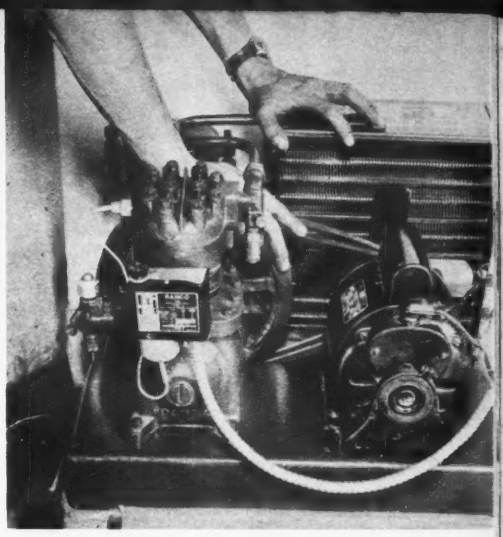


FIGURE 11



Here's a typical refrigerating unit. It's been thoroughly dehydrated at the factory and is ready to be bolted down to a suitably heavy foundation.

Making the final connections, blowing out and charging system, adjusting the various controls, and testing under pressure are service man's job.

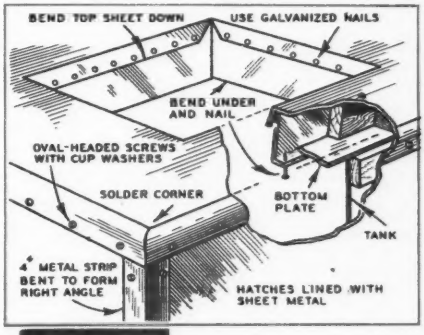
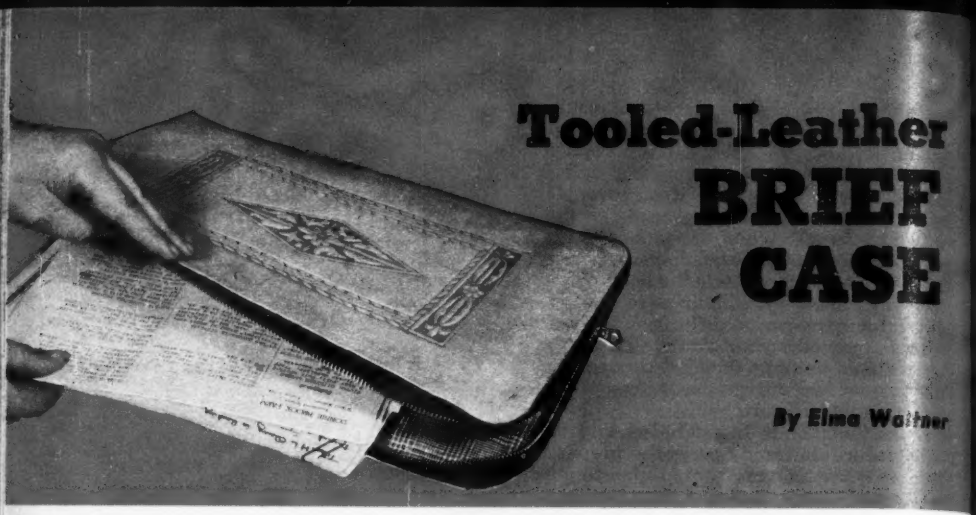


FIGURE 12



Tooled-Leather BRIEF CASE

By Elmo Wattner

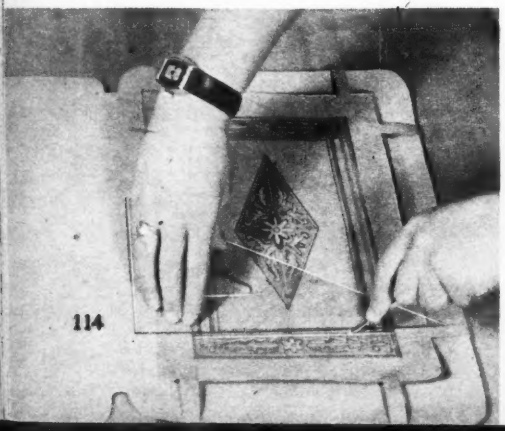
Large in size and expensive in appearance, here's the perfect Christmas gift for the executive in your family.

RELIEF tooling gives an air of elegance to this leather carrying case. It is large enough for music, notebooks, or legal-size papers and has two pockets in the lining for miscellaneous smaller items. Tooling leathers are available in various weights and colors. Here, russet steer hide of about 5-oz. quality was used. This leather is light tan in color. The tooling process, by compressing the material, makes the design slightly darker than the natural leather.

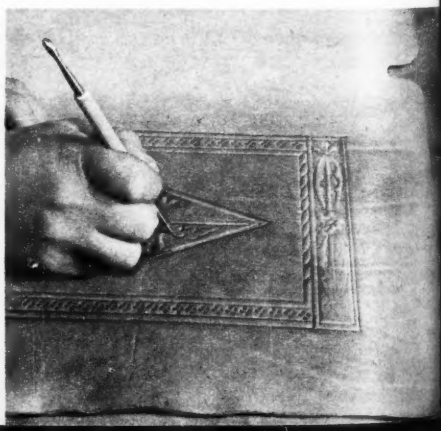
Cut the leather blank to the size shown in Fig. 1 and spread flat, smooth side up, on a hard surface. Before tooling, dampen the top of the leather with a sponge or cloth. It should be damp enough so the indentation remains after a tool is pressed down into the surface. If too damp, the tool will make an impression, but it won't last. If too dry, the tool won't make any impression.

Fig. 4 shows the design used. Lay it out on a sheet of heavy paper and fasten the paper in proper position over the dampened leather, using strips of gummed paper that pass over the edges of the leather and are stuck to the underside. Employing a tracing tool (a nut pick will work equally as well), transfer the design to the leather. Remove the pattern and, using a ruler and the tracing tool, go over the lines to imprint them deeper. Next, with a round-end tool, work down

Fasten pattern to dampened leather with gummed paper strips. Transfer design with tracing tool.



After removing pattern, go over lines to imprint them deeper so they may be followed when tooling.



the background so the design stands up in relief. For distinct lines at the edges of the design, use the tracing tool again.

The diamond pattern that runs along the two long edges is made with a stamp fashioned from a nail. Any desired pattern may be filed in the head of a nail if you first clamp the shank securely in a vise.

After completing the tooling, spread the leather out on a waterproof surface, dampen it slightly, weight the edges, and allow it to dry thoroughly.

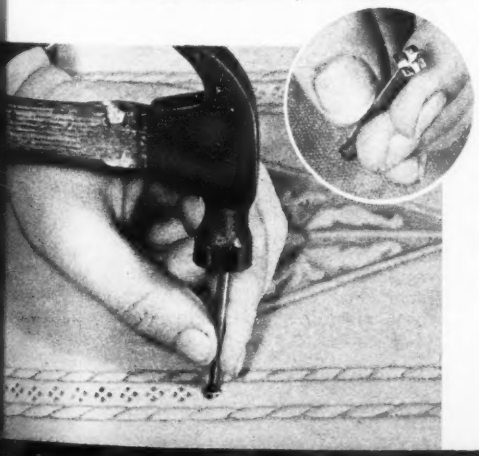
A 36-in. slide fastener of the heavy-duty type is sewn to the leather, using heavy thread, as shown in Fig. 3. If desired, the fastener may be basted in place first to get the proper adjustment.

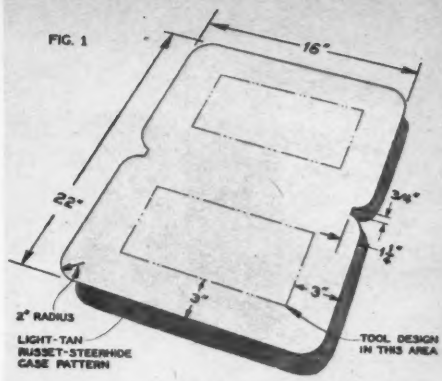
The fabric lining is cut to the same size as the leather except that one end is left long so it can be folded back to form the pockets indicated in Fig. 2. After folding the cloth, stitch across the bottom edge and through the center, thus forming two pockets. Cut two pieces of light, flexible cardboard and insert them in the pocket walls to act as stiffeners.

Two more pieces of cardboard (that used in suit boxes is excellent for the purpose) are now cut to fit the two sides of the case. Lay them in position, place the lining over them, and sew it by hand to the slide tape, as shown in Fig. 3. To keep the cardboard stiffeners in place, sew the lining to the case along the center fold.

Leather-modeling tools may be bought from your local handicraft dealer or may be improvised from items such as the previously mentioned nut pick or wire nails, ice picks, and scrap pieces of tool steel. Other tools that will be needed include a sharp knife, suitable for cutting leather; a 12-in. steel rule; and a light hammer. As a foundation for tracing and tooling, a sheet of thick glass or a slab of marble is ideal. •

Using the tool depicted in the inset, stamp the repetitious design along the two longer sides.





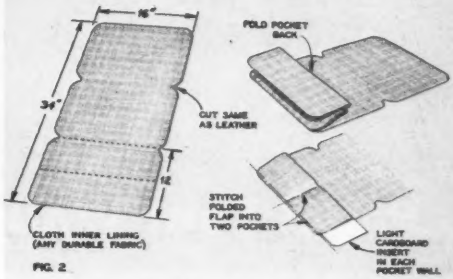


FIG. 2

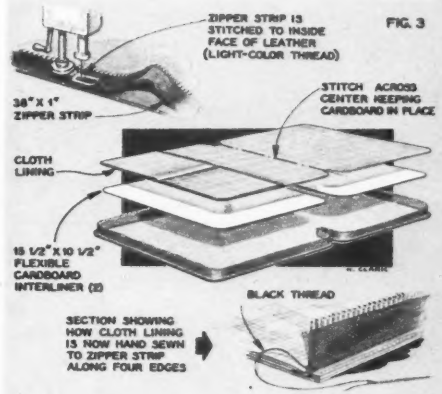
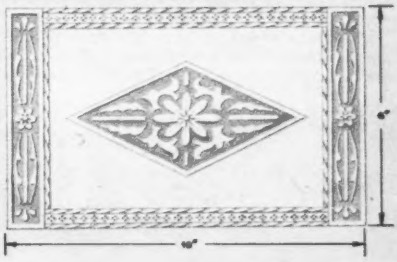
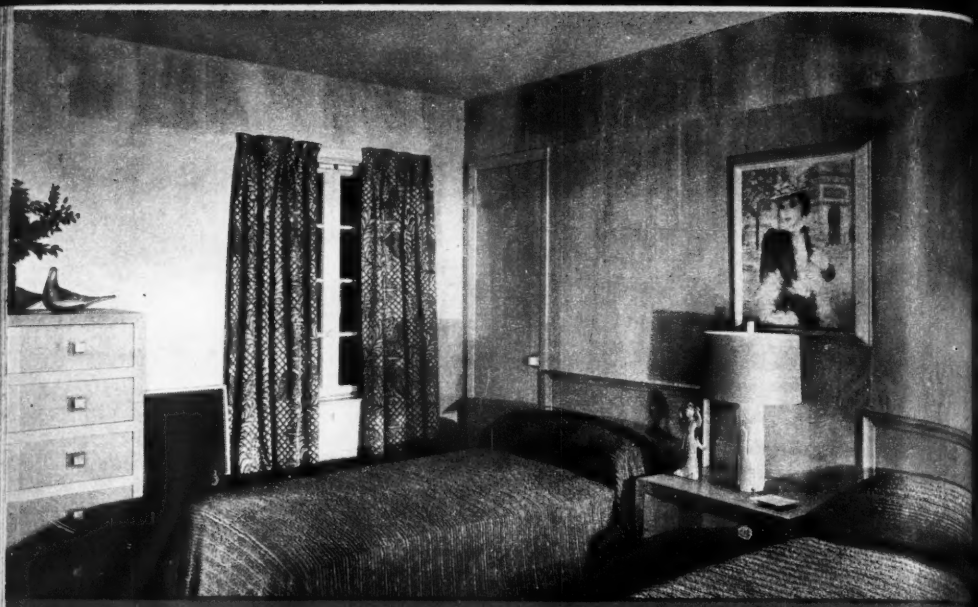


FIG. 3

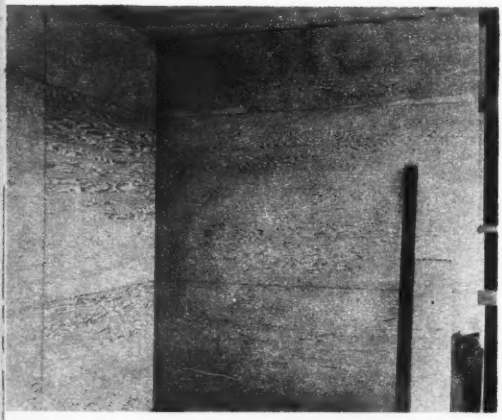
FIG. 4

DESIGN PATTERN FOR TOOLING

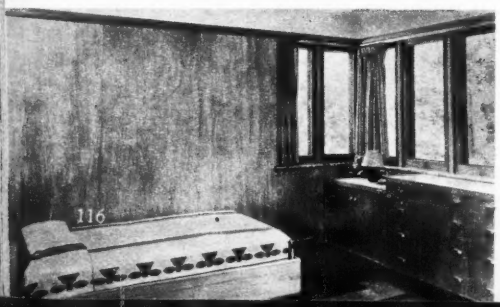




Panel Your Walls With PLYWOOD



Standard 4x8-ft. plywood panels, such as those shown immediately above, are the units employed when creating all the interiors reproduced here. The bedroom at top of page has birch walls and the children's room below has a plaster ceiling and red-birch walls. (U. S. Plywood Corporation)



With the simplest of hand tools, you can create luxurious paneled interiors at amazingly low cost.

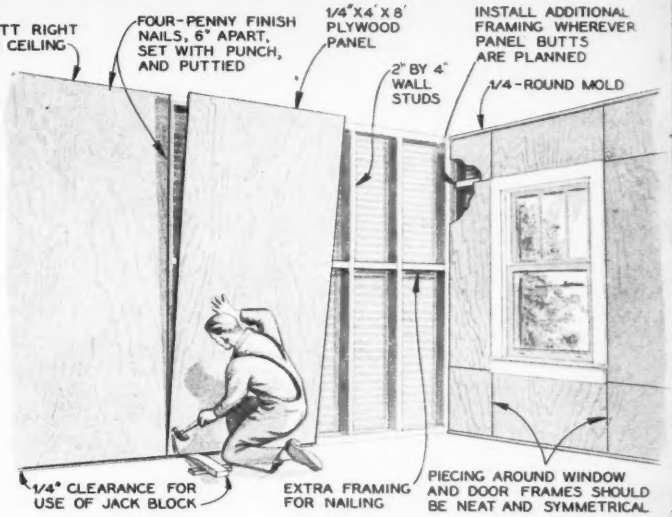
By Robert I. Scharff

IF you want rich-appearing walls and ceilings with a minimum of money and labor, panel with plywood. Plywood is one of the most useful and versatile materials available to the homeowner. It comes in finishes ranging from richly figured oak, mahogany, and walnut down to low-cost fir and pine, allowing a choice of decorative material to meet every possible taste and budget. It can be applied effectively to either traditional or modern interiors and offers a beauty found heretofore only in the mansions of the wealthy.

One outstanding advantage in the use of plywood for interiors is the elimination of periodic redecorating and patching of cracks. Plywood is crackproof and, when properly installed, will outlive the house. The only upkeep required is an occasional waxing; so, when using it, the first cost is the last. Coming in large sheets, ¼ in. thick, 4 ft. wide, and 8 ft. long, it can be erected quickly and easily by any handy homeowner using ordinary hand tools.

The selection of a suitable panel arrange-

FIG. 1 - ON MEDIUM WALLS, 8 FT. HIGH, PANELING IS APPLIED UPRIGHT



ment for the area to be covered is the first step in the creation of a paneled room. The accompanying photos and drawings show several wall treatments for medium-sized rooms. The basic paneling rule is that vertical joints are first lined up with wall openings; then blank wall spaces are divided into orderly pattern arrangements (Fig. 1). Following this rule, many pleasing designs can be developed. For instance, a horizontal effect is created by using panels installed lengthwise and with the joints showing, as in Fig. 2.

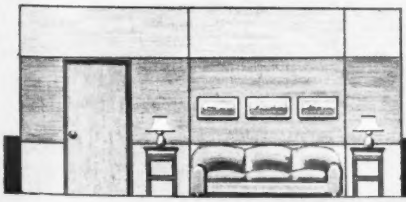
Charming walls can be had by using a chair rail with paint or wallpaper above it and plywood below. Another method is to use contrasting woods, the darker one being either mahogany or walnut and the lighter one a less-figured material of a cheaper grade.

To erect panels over existing masonry walls, such as in a basement, apply furring strips to provide the necessary nailing surface (Fig. 4). Before actually starting furring, it is wise to coat the walls with a heavy layer of asphalt or water-resisting paint. The furring is plumbed and secured to the masonry with cut nails spaced 12 to 14 in. apart. As any basement wall may occasionally become damp, allow air to circulate freely behind the paneling by leaving ¼-in. openings along the top and bottom edges. The panels should be back-primed with a resin sealer or primer before erection.

In rooms other than those in the basement, the panels usually can be nailed directly to the studs. It is essential, however, that the framing be plumb and true to assure a smooth, flat wall surface. If necessary, framing members should be added to provide nailing bases for all edges of the plywood. Furring strips are not ordinarily required when nailing panels to plaster walls in good condition as the studs behind the plaster are generally 16 in. on centers. When the plaster is badly broken, remove it and nail the plywood directly to the studs.

For a durable job when fastening plywood to studs or furring strips, the use of glue is recommended since it makes the wall a rigid, continuous unit. Cover the framing members with a good casein or cold-resin glue, secure the panels in place

'THREE-PANEL' METHOD. HORIZONTAL JOINT LINES ACCENT LENGTH OF WALLS



CONTRASTING WOODS OF LIGHT OR DARK VALUES ADD UNIQUE CHARM

FOR HIGH OR LONG WALLS, PANELING MIGHT BE APPLIED IN SMALL SECTIONS LENDING SYMMETRY TO THE FINISHED INSTALLATION

FIG.-2 TYPICAL EXAMPLES OF PANEL-BUTT FINISHES

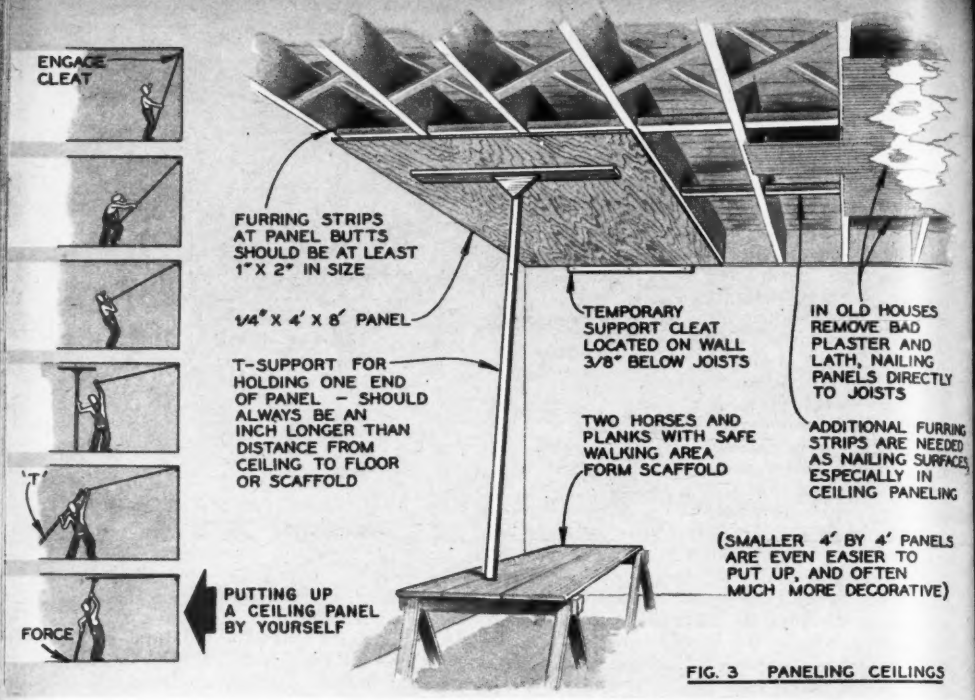


FIG. 3 PANELING CEILINGS

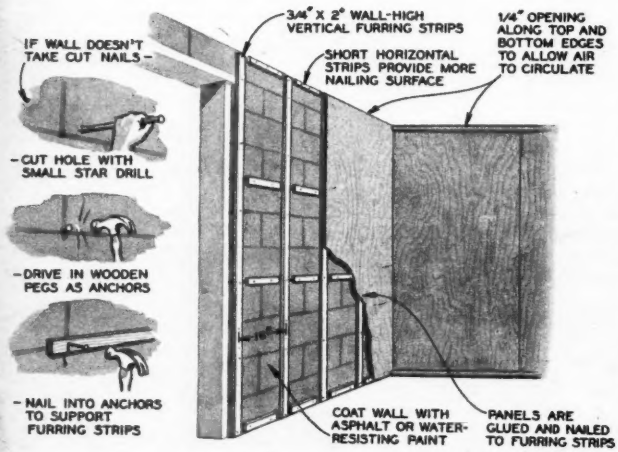
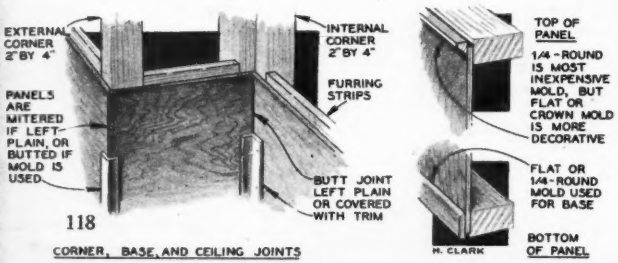


FIG. 4 PANELING CEMENT-BLOCK OR CONCRETE BASEMENT WALLS



CORNER, BASE, AND CEILING JOINTS

with 4-d. finishing nails driven 6 in. apart, set the nails, and fill with plastic composition wood.

When paneling, start in one corner of the room and work around. Be sure to see that the panels are square with the adjacent walls and ceiling before nailing. Keep the bottom of each wall panel about ¼ in. above the floor to allow space for the lever used to pry the panel tightly against the ceiling (Fig. 1).

In covering a ceiling, a T support like that shown in Fig. 3 is used to hold each panel in place. Nail and glue ceiling panels either parallel to or across the joists, whichever works out to the best advantage. The procedure for erecting a ceiling panel is shown in Fig. 3. First, a temporary cleat is nailed to the wall ⅜ in. below the joist line. Then one end of the panel is placed on the cleat and, by using the T support at the opposite end, the panel is raised into place.

Typical panel joints appear in Fig. 2. The butt joint is the easiest and most common method. The panels are forced

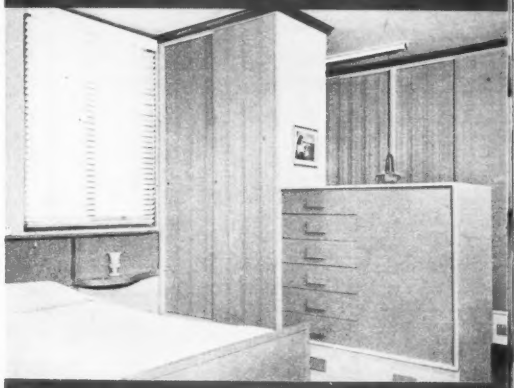
tightly together, glued, and nailed as described above; then the cracks are filled with plastic composition wood. In making the attractive V joint, the edges are shaped with sandpaper wrapped around a block of wood. Be careful not to cut the edges of the panels down beyond the face veneer. Plain and fancy-wood batten strips are also used in making joints. A new molding, made with a wood-veneer face bonded to extruded aluminum, eliminates face nailing, open joints, countersinking, and puttying. This molding is nailed to the studs or furring strips; then the panels are slid into place.

After the paneling is installed, all that remains to be done is to apply the finish. With today's trend being toward light interiors, satin-finish clear lacquer is preferred to heavy coats of shellac and varnish such as were used in the past. Lacquer produces a natural finish that permits the grain and color of the wood to dominate, yet provides adequate protection against wear. Before putting on the lacquer, go over the panels with No. 00 sandpaper; then clean the surfaces with a dust brush. Apply two coats of the lacquer, going over the paneling with steel wool after each coat (waiting, of course, until the lacquer is dry). After steel-wooling the second coat, apply white wax. By rubbing the wax soon after it is put on, a soft sheen is obtained. By allowing it to set for a few minutes before rubbing, a glossy finish is achieved. For most paneling, a medium sheen is recommended. Two coats of wax are, naturally, desirable for the best results. Occasional waxing afterwards will keep the wood fresh and new looking.

The popular pickled or blond finish is obtained by using a white wood-sealer paint that is thinned with turpentine or mineral spirits. Brush it on and allow it to set for three or four minutes; then rub it into the pores, wipe the surface clean, and let dry overnight. The next day, go over lightly with No. 00 sandpaper and apply a thin coat of pure white shellac. Allow to dry, sandpaper, and put on a coat of satin-finish lacquer. Again allow to dry, rub down with steel wool, and apply white wax, rubbing it as described above to produce a sheen.

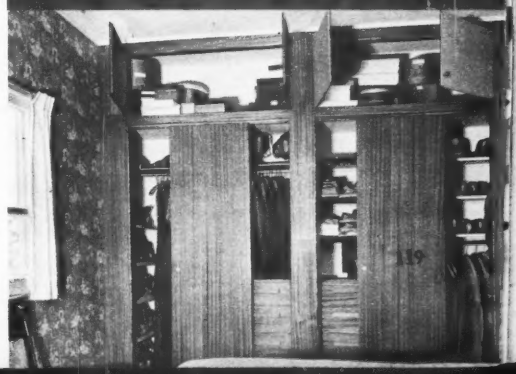
To finish fir, pine, or any other soft wood, first give it a coat of resin sealer to minimize the tendency of the grain to rise and show through; then paint it, stain it, or apply a natural finish, following the procedure previously described. •

Ceilings, too, can be paneled effectively. Here, striated panels are used to set off oak walls.



Plywood is also useful when fabricating built-in furniture such as the wardrobe and dresser above.

Len Doyle, who plays Harrington on NBC's "Mr. District Attorney," paneled his own bedroom.



Spacious closets, right, go up quickly when you employ plywood panels and stock sliding doors.

car care

Photo by Robert Brighton

Crank shaft balance is essential in a major motor overhaul. Check it before fitting new bearings, pistons and rods. New damper may be needed.

Sticky valves in modern engine is sometimes due to a rusted water distribution tube in the motor block. Without uniform cooling, valve stems warp.

Clean coils are an aid to quick starting in cold weather.

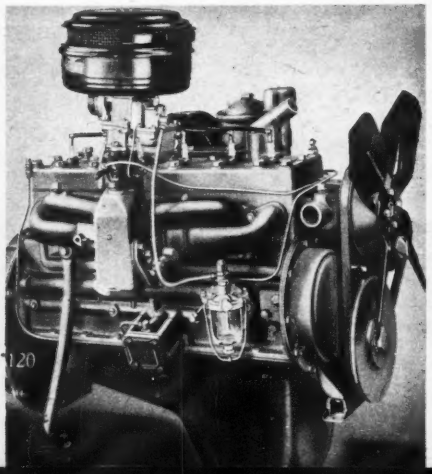
Hot water heater won't work too well if the radiator water level is too low.

Undercoating is excellent protection against the salt which many cities use on icy streets during the winter.

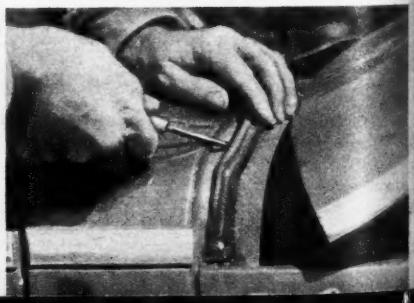
If the shoulders of the rear tires are not too worn, you'll be able to pull out of a snow bank by partially deflating the tires.

Radiator leaks are sometimes the result of a dented overflow pipe. Steam and water cannot escape in normal way so they force an outlet in the core.

Below: The air cleaner should always be installed with the metal apron facing the radiator and not the dash. Clean and oil it every 2,000 miles.



Below: Hood lacing, if allowed to become flat and dry, will cause loud squeaking. Pry it up a little and give it an occasional dose of oil or grease.



BEHIND THE WHEEL

With Fred Russell

If you want a personal reply, please include a self-addressed, stamped envelope.

My 1937 Nash shakes as though it were going to fall apart. Richard K. Koerek, Holes Corners, Wisc.
Excessive vibration may be due to need for new motor mounts, or, the engine's idling mixture may be way off base. Have you tried adjusting the carburetor and checking the ignition timing?

The push rods on two cylinders of my 1938 Chevrolet bend as fast as I install new ones. I can avoid this bending by leaving twice the required clearance, but then they are too noisy. As soon as I adjust the valves to the correct clearance I can actually see the push rods bend. Carl L. Wing, Cape Neddick, Maine.
Your trouble may be due to incorrect firing order. Warped valves are another possibility. Have you checked the rocker arms?

My 1946 Plymouth has a knock in it when I accelerate from 45 to around 70 mph. It has been that way since it was new. Arnold W. Bachman, Kansas City, Mo.
The knock you describe may be due to a variation in compression between the different cylinders.

Would it be advisable to install a new set of rings in my 1937 Buick. This car has already had a major motor overhaul. C. E. Farrington, Port Jervis, N. Y.
Before installing a second set of rings check the cylinder walls for taper and ellipticity.

My 1948 Ford always misses when I feed it gas. At steady speeds it fires perfectly. New plugs have been installed, carburetor cleaned, new points and motor tuned. And still it misses. I. J. Conway, Omaha, Neb.
Your symptoms point to a sticking valve.

Are your wipers noisy? This is sometimes due to the ends of the blades striking the windshield frame. Remedy? Cut them shorter or bend up ends.

Mysterious rattles can often be traced to the tail pipe assembly. This is especially true of today's cars with their rubber-mounted exhaust systems.

Radiator pressure caps should not be removed when engine is hot. If opened while hot, there will be no pressure build-up until system cools off again.

Newest auto accessory, "Shur-Hete," plugs into house line to keep motor at an even 120°F.

Three popular sizes of soldering irons. Left: "pencil" type needed to get into the crowded chassis of television receivers. Center: medium-size (65 watts), suitable for most wiring purposes. Right: heavy-duty (150 watts), good when working outdoors on aerials, and for making repairs on household devices.

Some Hot Tips on Soldering

By Robert Hertzberg

"WHAT has been the outstanding problem or difficulty experienced by people who made their own television receivers from your kits?" This question was recently put to a radio manufacturer who has sold thousands of highly-complicated, multi-tube sets in knockdown form.

"Since many of my customers are bankers, housewives, bus drivers and carpenters, you'd probably expect that they had trouble just identifying such things as video tuners and power-supply bleeders," he answered. "Actually, the parts and the trick circuits didn't scare them a bit. Do you know what turned out to be the main headache? Believe it or not, poor soldering! About half the sets brought in to us to 'fix' were wired absolutely correctly, but many of the connections were what we call 'cold soldered' and came apart when touched. My advice to all radio fans is, 'Learn to solder, and you'll be ahead of the game at the start.' "

Soldering is an extremely simple operation. You can learn all about it in five minutes. Every connection you make will be a strong, tight one if you remember and apply the one and only rule of the process: *Everything must be clean.* Gobs of flux and mountains of solder will not have the slightest effect on a dirty surface.

To start with, your soldering iron (which isn't iron at all, but copper) must be well "tinned." This means that the tip has a

clean, shiny layer of solder on it. Suppose you plug in your iron. While it's warming up, clamp it in a vise and *lightly* file the faces of the tip with a fine file. Press just hard enough to remove pits and rough spots, and no more. Put the iron on a stand, and hold the end of a piece of rosin-core solder against the tip. At first only the rosin will melt; then, as the iron comes up to full temperature, the solder will also melt and cover the clean tip. Turn the iron so that all faces of the latter are tinned. The excess rosin will burn off by itself. "What's the purpose of the rosin?" This is a common question. When heated, practically all metals combine with the oxygen in the air. An oxide forms on the surface, and this acts as a thin protective skin in preventing the molten solder from adhering. A "flux" is a chemical that prevents the oxide from forming. Rosin is universally used in radio work because it has no corrosive after-effects and because it works nicely on the non-ferrous metals commonly found in radio construction: copper wire, particularly, and brass in many forms.

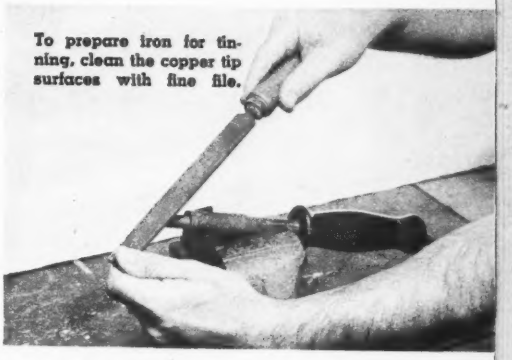
To make things easier for radio constructors, hook-up wire and soldering lugs are pre-tinned in manufacture; that is, they are coated with a very thin layer of solder. Making a tight connection is merely a matter of twisting the wire around the lug and applying the rosin-core solder to the joint with one hand and holding the hot iron over it with the other hand. Soldering takes heat. Leave the iron in place for about five seconds, to permit the molten metal to fill the crevices of the joint and to allow the rosin to boil out. Withdrawing the iron too soon produces a cold or "rosin joint," with a layer of sticky rosin between the solder and the parts to be joined. The joint looks good, but the unburned rosin forms a high-resistance element that very, very often keeps a circuit from working properly. Many of the "defective" television receivers mentioned in the first part of this article were cured by the application of a hot, clean iron to most of the connection joints.

Pre-tinning is a big help, but not a substitute for cleanliness. If your fingers are dirty or somewhat waxy (from handling paper-cased condensers) and you handle and twist the wires with them, the solder will form small balls and roll off stubbornly no matter how long you hold the iron in position. Some types of impregnated insulation used on hook-up wire give the surface a waxy film; the wire looks clean and bright but just doesn't take the solder.

There are several solutions to these headaches: a) As [*Continued on page* 132]

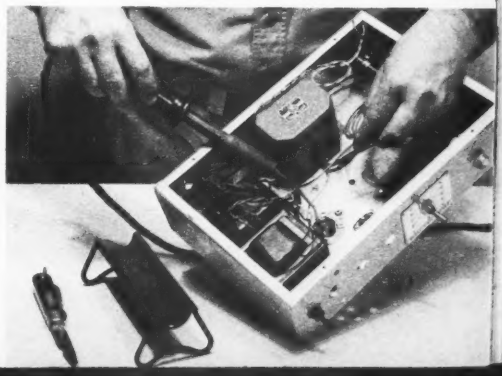
Medium-size soldering iron and accessories. Bottle contains zinc-chloride flux, for soldering iron. Can contains paste flux. Roll of rosin-core solder is best for radio work.

To prepare iron for tinning, clean the copper tip surfaces with fine file.



As iron warms up, apply rosin-core solder to cleaned tip. Iron is ready for use when the rosin reaches sizzling point.

The proper way to wire a radio set is the simple way. Carefully turn the chassis so that the solder runs slightly downward but doesn't drip.



Monthly Photo Contest

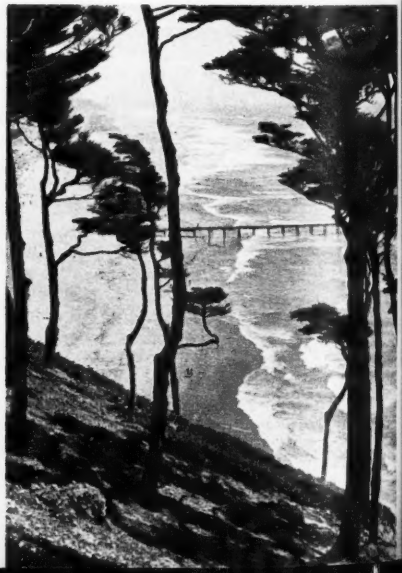
$10.00 Award .....In a Jam
A 4x5 Speed Graphic picture by W. H. Greenfield of Reno, Nev. Verichrome; photoflash at f-22.

$5.00 Award .....Storm Signals
Julien H. Turk of Baltimore used a Super Ikonta B for this lovely pastoral. Pan film; yellow filter.

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Address: Monthly Photo Contest Editor, MECHANIX ILLUSTRATED, 67 W. 44th Street, New York 18, N. Y.

$5.00 Award .....'H'ya'
Enlarged from a 35mm negative by Irving Sauer of Chicago. Super XX film; 1/50th and f-11.

$5.00 Award .....Seascape
Walter Jebe of San Francisco used a Rollei for this photo. Plus X film: 1/50th at f-16. Excellent technique.

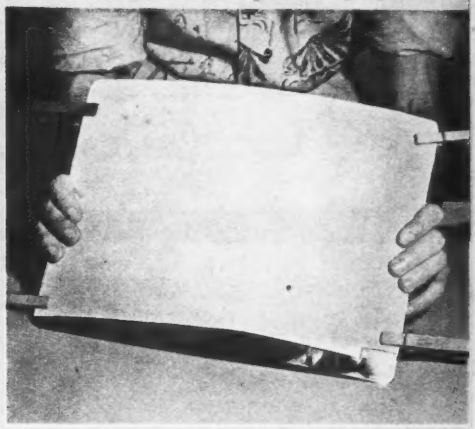


FERROTYPING

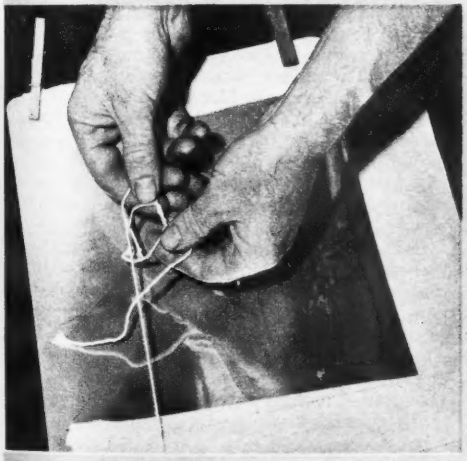
1. Ferrotyping will be much simpler if you place a bath towel over the prints before applying the roller. Roll carefully to prevent prints from slipping.

2. Remove towel, roll prints from center to edge. When no more moisture appears, you can be certain that prints will dry with high gloss.

3. Avoid uneven drying. This will cause one side of print to pull away from tin before rest is dry. This is the chief cause of "oyster shells" on glossies.



4. To prevent prints from drying unevenly, it is a good idea to place a towel over the tin. Fasten towel with a clothespin at each corner.



5. To keep the towel tight, bend the ferrotype plate and tie a string around it. String should be just tight enough to give prints a slight convex curl.

6. At this stage it is safe to place the tin in front of a hot air register or other source of heat. Too rapid drying will always yield curled prints.

Personal Xmas Cards

Merry Christmas

Ruth, Marvin, and Stewart Sussman

Write message on white paper and then make contact negative. Use contrast film.

The family scene negative is then mounted in one corner of the message negative.

By Homer Hansen

YOU don't have to be a professional artist or have a copying camera to make these photo Christmas cards. All you will need is some tracing paper, dense black drawing ink, a fine pen, some cut film of a contrast type, and some deckle edge, double weight printing paper.

The first thing to do is to get a print of a suitable family scene, something similar to the picture at the top of this page. Mount this picture in one corner of a 4x5 sheet of tracing paper. The rest of the sheet is used for the personal message which should include the individual names of the family. Shift the picture up or down or from side to side in order to gain the most pleasing composition. You will just have to experiment. So far, no enterprising manufacturer has offered a composition meter.

Remove the picture and make a negative of the message by printing it in contact with a high contrast film. Develop, fix it, wash and dry. Cut out a square in this message negative to make room for the picture negative. Tape it in place so that it will not shift. Then use the entire combination to print the message cards. Use double weight 4x5 deckle edge paper. This is a standard stock item available at all photo supply stores.

In the second method illustrated at the top

are two different methods of making up your own personal greeting cards that have a charm that no commercial card can offer.

of this page, a suitable drawing from an old Christmas card is utilized. Trace the drawing and whatever lettering you want to "lift" on a thin sheet of tracing paper. See the photo at the right.

This tracing is then placed on your contact printer or printing frame, face up. A piece of high contrast copying film is then placed in contact with this sheet of paper, face down. A short exposure of about ⅕th of a second is all you will need, provided nothing stronger than a 10-watt lamp is in the printer. Develop it in a high contrast developer such as D-11. Or, you can use a regular paper developer, provided you use it without the customary dilution. Use a red safelight for this operation.

This negative is then used to print the actual greeting cards, using the same technique as outlined for the first style.

Both methods you will note, completely eliminates the use of a copying camera. Copying, of course, will enable you to enlarge or reduce the final negative which is used to print the cards. It also does away with the use of an enlarger. In other words, it is ideal for the kitchen darkroom worker whose chief piece of equipment is a contact printer or printing frame. As a finishing touch, you can add a plate-sunk effect by embossing the back of the card. •

First trace the picture, lettering and your own message on paper. Use black ink.

Making a contact negative of drawing and lettering. This, in turn, prints the cards.

Flying Dutchman

[*Continued from page* 108]

Centerboard Head Ledges. White oak, 2½x3½ in., with the larger dimension running athwartships. At the bottom, each head ledge is notched to a thickness of 1½ in. so it can be slipped down into the centerboard slot. Plenty of marine glue should be applied at this point and, when in place, two bolts should pass entirely through the keel and each head ledge. Both head ledges are long enough to extend to the cabin roof, the forward one helping to support the roof beam at about Station 7 and the after one being beneath a block of white oak spanning two of the roof beams, as shown. Great care must be taken that these head ledges are square with the waterline in both directions.

Centerboard Trunk Logs. White oak, 2x6 in. Along each upper inner edge there is a 1x1-in. rabbet facing the slot. They are also rabbetted at the ends, around the head ledges, to which they are bolted. The distance between the trunk logs is equal to the width of the slot. These logs must through-bolt in the rabbet all the way down to the bottom of the keel, there being not less than five bolts in each of the logs. The trunk sides are made of two layers of 1-in. white oak, the inner layer being screwed into the trunk-log rabbet after plenty of marine glue is applied. Use 1¾-in. No. 12 screws, spaced not more than 3 in. apart. The outer layer is of similar material, but arranged so the seams of the two layers are staggered. Plenty of glue or white lead must be applied between the layers. The two layers are fastened together along the seams with 1¾-in. No. 9 screws, spaced no more than 4 in. apart. The trunk sides are built up to a total height of 34 in. above the keel. Great care must be exercised in the construction of this trunk to make it tight and strong.

Bitts. There is a main mooring bitt, 4x4 in., of white oak or locust, located as shown, mortised into the stem knee, and fastened there with not less than two drift bolts. This bitt extends 9 in. above the forward decking and is fitted with a 1-in. bronze pin approximately 9 in. long. Above deck, the bitt is neatly beveled off. Aft, there are two additional bitts extending from the bottom of the boat up the face of the transom and for a distance of 15 in. above the rail line. These are of white oak or locust, 3x3 in., spaced 22 in. apart and thoroughly secured to the transom with ¼-in. bolts. At their top is a 1-in. bronze rod to be used as a traveller.

This rod is approximately 30 in. long and is pinned to prevent it from shifting from side to side.

Mast Step. White oak, 4x4 in., notched over three frames, as shown, and secured to those frames with ¼x8-in., drift bolts. A square hole, 3 in. fore and aft by 1¼ in., is cut in the step to receive the heel of the mast.

Bottom Frames. White oak, ⅞x4 in. One frame is placed on each Station, as provided by the Offset Table, and there is one additional frame at each Half Station. There is also one extra bottom frame at the after side of the after head ledge. Two feet off the centerline, each of these frames has a ¾x2-in. limber hole. This distance cannot be maintained forward of Station 7, where the limber holes will have to be alongside the keel batten and triangular in form, as shown on Sections 8 and 9. Each bottom frame fastens through the keel with a ¼-in. through bolt. Note that the bottom frames fall on the after sides of the station marks.

Side Frames. White oak, ⅞x3-in., located on the forward sides of the station marks. These frames should extend quite a distance above the main sheer, as the rail frames are attached to them. At the chine, the side and bottom frames are notched for the chine and are fastened together with three ¼-in. bolts. The rail frames are the same size as the side frames and are on the after sides of the side frames, fastening to each with three ¼-in. bolts. These frames project an inch or so above the rail line and can later be cut. The three frames at Stations 9, 9½, and 10 have extra floor timbers, the same size as the bottom frames, extending across the top of the stem knee and fastening with two bolts to each side frame.

Keel Battens. Between each bottom frame, except in way of the centerboard trunk, there is a white-oak keel batten, 1¼x6 in. This 6-in. measurement is net and even an additional width will do no harm. Each keel batten fastens to the keel with not less than three 3-in. galvanized boat nails driven at slight angles. The joint between batten and keel must be coated with marine glue or white lead.

Chine. There are two chines, an inner and outer one, both being 1¼x2½-in. white oak, preferably in single lengths. The outer one fits into the frame notches, boxes into the stem and transom cleats, and fastens to each frame with at least one 2-in. boat nail. The inner chine is bent at the intersection of side and bottom frames and must be beveled off on the bottom to form a good brace for the frame laps. Better than beveling would be to notch the underside of the chine across each of the

[*Continued on page* 130]

photo shorts

Lens Tester. A paint chart makes a convenient chart with which to test the sharpness of that new lens. Effects of different filters can also be determined.

Prevent Double Exposures. This calamity can be eliminated when using cut film holders by marking each holder with a large "X" as soon as it is exposed.

Paper Tip. After the inner envelopes have been removed from their containers, it's quite easy to lose track of their grade. Mark the flaps to prevent this.

QUESTION BOX

By Robert Brightman

If you want a personal reply, please inclose a self-addressed, stamped envelope.

Why does my Eastman Kodak No. 4 have two sets of lens openings? Ernest Bocchinfuso, Maspeth, L. I.

Many old cameras had convertible lenses. By unscrewing the front element a different focal length was obtained. However, the "f" values listed on the dial were no longer in effect, hence the second set of diaphragm values.

How can I make a negative out of a contact print? John J. O'Toole, Elmhurst, L. I.

The best way is to copy it. In order to do this, you should have a camera equipped with a ground glass. This is necessary for exact focusing.

Can I use a filter without any increase in exposure by using a faster film? Carl F. Schmid, North Girard, Pa.

Most yellow filters require an increase in exposure of about two times. If a scene calls for 1/50th at f-16 with Plus X, you should open up to f-11 with yellow filter. However, if you use Super XX film which is twice as fast as Plus X film then, using the filter, keep it at the same exposure, f-16.

Which camera is best for 8x10 enlargements, a single frame or a double frame 35mm camera? Peter Zou, Waskatenau, Alberta.

Neither.

Can I take a photograph from my television receiver? Jack McCoy, Norristown, Pa.

Try f-2 at 1/25th of a second. Use a high-speed panchromatic film.

Can I make a photo enlarger around my Falcon miniature camera? Richard Hartman, Bloomsburg, Pa.

We are afraid you won't have much luck making an enlarger with a Falcon miniature as part of the optical system. In order to focus the image on the easel the lens should be able to be racked back or forth about 3 in.

Flying Dutchman

[*Continued from page* 128]

bottom frames. Fasten with one boat nail into each side and bottom frame.

Main Clamps. Longleaf yellow pine, 1¼x 2½ in., in single lengths if possible, fastened to each side frame with two galvanized boat nails and boxed into the transom cleats. It is important that the clamps be located in the proper position below the sheer line so the deck beams can rest upon them and the top of the decking come exactly on the main sheer line.

Main Deck Beams. ⅞x2½ in., cut to a camber of 19 ft. 6 in. There is one extra deck beam as a filler between the bulkhead and the regular beam on Station 8. In way of the hatch above the forepeak, the beam on Station 9 is cut as shown and the hatch framed up with fore-and-aft carlings the same size as the beams. Deck beams from Stations 3½ to 7 are installed on the forward sides of the side frames, being screwed or bolted to the heads of the side frames. In way of the cabin, there are short beams extending to a point 2 ft. 10 in. from the centerline of the boat and resting upon 1¼x3-in. carlings firmly attached to the bulkheads at Stations 3 and 8.

Cockpit Deck Beams. Same size as main deck beams, but cut to no camber. Bolt to the after side of each frame and locate so the cockpit decking will be 9 in. above the waterline or 3 ft. above the base line. In way of the engine box, a hatch is framed up. It is suggested that the engine be installed at about this time so the size of the hatch can be made to suit the machine installed, making sure to provide plenty of space for working around the engine and reaching into the storage space under the cockpit deck. It is advisable to place a post on the centerline from each of the cockpit beams down to the keel to keep the deck from sagging.

Mast Partners And Fillers. In way of the mast and for the entire distance from it to the stem there are 2-in. fillers of scrap wood to provide a firm foundation for the mast wedges and the bitt.

Breasthook. 1¼ in. thick, in the form of a triangle, filling in between the forward ends of the clamps and the stem. Should be well fastened through the clamps and also to the stem.

Bulkheads. The bulkhead at Station 8 is constructed of 1-in. marine plywood. In way of the lavatory, a paneled door leading to the forepeak is installed. While this can be a hinged door, it will be more convenient if it is arranged to remove, being held in place with cleats and thumb buttons.

Engine Bed. It is impossible to specify the shape of the engine bed as it will vary to suit the engine installed. Basically, it is made of 2-in. yellow pine or white oak, notched over frames from Stations 2 to 3½, and through-bolted to them. The bed is installed at an angle to the centerline in such a position that the shaft line intersects the centerline at Station 3 and is approximately 12 in. off the centerline and not less than 10 in. below the top of the keel at Station ½. It is highly important to know what engine is to be installed and what the direction of rotation will be. A lefthand engine turning a righthand propeller should be installed with the propeller on the starboard side. A righthand engine turning a lefthand wheel should be installed at the opposite angle. Where the shaft passes through the hull, a 4x4-in. wedge-shaped shaft log is installed and bolted down to the planking over a canvas and white-lead gasket. This shaft log carries the stuffing box. The after end of the shaft is carried on a strut bolted through the planking with fillers on the inside, said strut to have dimensions to suit the shaft size and angle required for the individual engine.

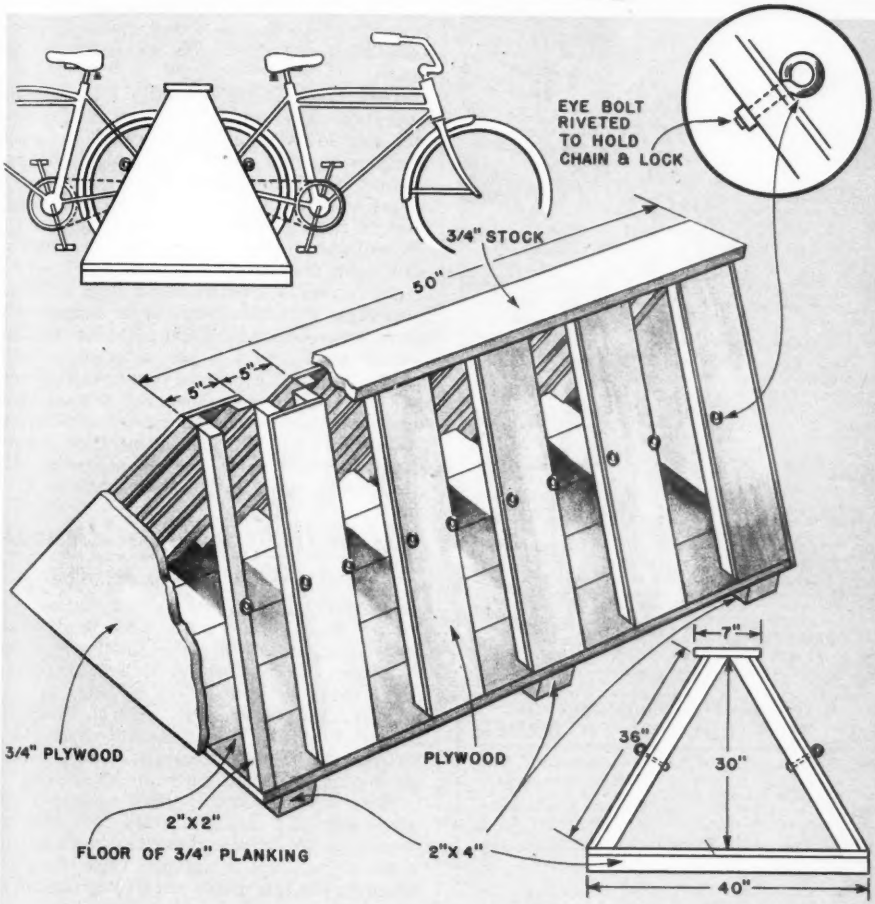
Cabin Construction. Each cabin side is carried on a 2x4-in. oak or yellow-pine sill. These sills are cut off at the bottoms at 8° angles from horizontal to impart the proper rake to the cabin sides and their tops are rabbeted to take said cabin sides. At the forward and after ends of the cabin are similar sills. The forward one bolts through a deck beam and the after one bolts through a cockpit beam and is framed up around the engine box. The cabin sides are 1-in. oak, yellow pine, or mahogany and are screw-fastened into the 1x1-in. rabbets in the tops of the sills. Use 1¾-in. No. 10 screws at intervals of no more than 4 in. While marine plywood could be used for these sides, considerable difficulty would be encountered when rabbeting it for the windows. The height of the sides is taken from the outboard profile.

The bottom and sides of each window opening have ¼x½-in. rabbets in order that a conventional jump-and-swing sash can be installed. On the outside, to protect the opening, there is a ⅜x2-in. batten at top and bottom. Each sash frame is 1x1½-in. oak or mahogany, rabbeted for the double-thick glass, which is held in place with quarter-round molding. Each sash is fitted inside with a handle and a hook for securing it to a roof beam. In the forward end of the cabin are two 6-in. portlights. •

(*Part II will appear next month*).

Bike Rack

BY increasing or decreasing the overall length, this neat bicycle rack can be made to accommodate as many two-wheelers as you want it to, the rear wheels of the bikes on each side being locked into alternate stalls. For display purposes outside of a bicycle shop, or for use at a school or theater, the rack efficiently protects the bikes from theft or damage. The bicycles are locked in place by means of chains run through the rear wheels and the securely riveted eyebolts on the rack. Individual padlocks are provided. Construction is of plywood on a planked base with 2x3-in. framing.—*Hi Sibley.*



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Mfrs. of famous Moto-Tool & Moto-Saw

EASY FOR AWKWARD PLACES

SANDS FLAT SURFACES EVENLY

GETS INTO TIGHT CORNERS

ROUNDS CORNERS LIKE MAGIC

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Hot Tips on Soldering

[*Continued from page* 123]

a minimum, work with clean hands, and try to handle the wire with pliers rather than with your fingers; b) Wipe the wire with a bit of clean, white cotton rag; c) Get tough, and scrape the wire very lightly with the *back* edge of a knife. Mind you, the back edge, and lightly. You're not pointing a pencil. You just want to expose a clean, bright surface.

The scraping technique is mandatory in the case of untinned wire. If the stuff is stranded, separate the strands and clean them individually as much as possible. Then twist them together, with pliers, not dirty fingers, scrape lightly again, and apply solder and iron.

By this time the iron is probably black with flaked and corroded copper and solder doesn't hold to it. File it again? No. Either wipe it quickly against a pad of clean rags or scrape it with the back of a knife, apply the rosin-core solder quickly, and it's ready for use again.

Radio soldering is normally a two-handed operation. The solder must be kept against the joint so that the rosin can melt in as both the joint and the solder heat up. Carrying a globule of solder to the joint on the underside of the iron, while the other hand is holding a part in place, will work only if the parts of the joint were previously well tinned and are still clean and bright.

Aluminum is used for radio shields, chassis members, etc. Sometimes it is necessary to make connections to these parts, particularly for "ground" leads. If you attempt to solder aluminum, you're in for a surprise. The metal just doesn't solder, because it carries a film of its own oxide even at normal temperatures, and no flux has yet been found that removes it satisfactorily for soldering purposes. Use a nut, bolt and a copper soldering lug. •

Al Williams' Gulfhawk

[*Continued from page* 101]

recommended that you use an engine from .29 to .45 cu. in. displacement because the larger engines are intended for that extra zip required for stunting. Before attempting a flight, make sure the model balances one half inch behind the forward control wire. This balance point can be obtained by adding lead weights in the cockpit in the case of either a glow-plug or diesel engine or by shifting the battery in an electric ignition system. Flying wires of .012" dia. and sixty feet long are recommended. A school yard or close cropped grass is the ideal flying site. Care should be taken on the test flights not to overcontrol the model. •

Moto-Tool

THE GIFT HE'LL LIKE *Best* AND USE *Longest*

ELECTRIC DREMEL POWER TOOLS

THE "POCKET-SIZE MACHINE SHOP"

A SHOP TESTED TOOL

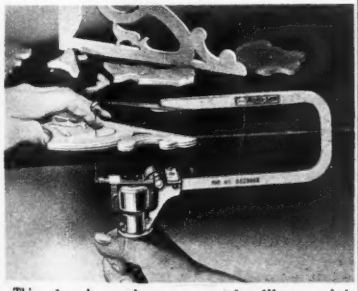
Moto-Tool is backed by over 12 years of industrial use . . . packs years of extra pleasure . . . yet, due to increased production, *pre-war prices still prevail!*

LOOK FOR THESE MOTO-TOOL FEATURES

Oil-less, sealed bearings • Patented automatic chuck lock pin • Oversize armature shaft; hardened, ground, polished • Shockproof, bakelite housing • Dust filtered air cooling system • Dynamically balanced for vibrationless operation • Exclusive hanger hook • Weight only 13 oz.

MOTO-SAW

THE *AMAZING* ELECTRIC SCROLL SAW



This electric coping saw works like magic! Easily cuts intricate scroll designs in medium-hard wood up to ¼" thick. Runs 7,200 strokes a minute . . . just guide it! Has only two moving parts . . . never needs oiling. Operates on 110-120 volt, 50 or 60 cycle A. C. electric current. As safe as a handsaw . . . thousands of satisfied users. Comes complete with 3 saw blades, at only **$5.85**

New DRILL PRESS

ONLY **$9.95** (Less Moto-Tool)

Only Dremel offers you a portable, precision drill press at such an amazingly low price. Just the thing for creating costume jewelry, model making, wood carving, routing, etc. Utilizes Model No. 2 Moto-Tool, which can be raised or lowered, swung in any direction, or quickly removed for off-hand use. Drill Press stands 12" high. Base is 6¾"x4". Weighs approximately 3½ pounds.

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Buy Dremel Tools from your dealer. If he cannot supply you, use coupon below to order desired items on 5-day trial, money-back guarantee. Items checked will be sent complete and postpaid for check or money order in full. Or, send only $2 with order, and pay postman balance plus postage upon C. O. D. delivery. Remember, YOUR MONEY BACK if not delighted after 5 days' trial.

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MODEL No. 1

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☐ Moto-Saw, with 3 blades, $5.85.
☐ ____dozen blades (60c per doz.)
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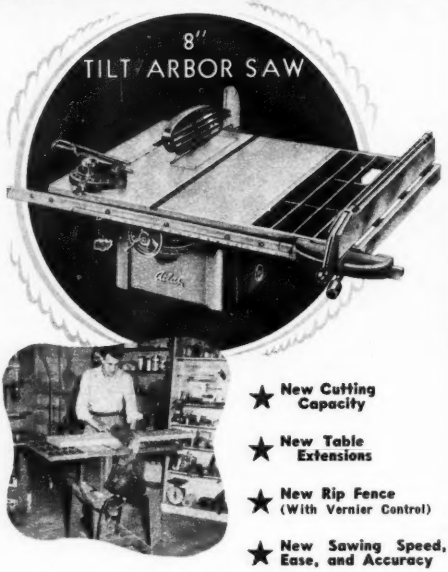
NEW Atlas



★ New Cutting Capacity

★ New Table Extensions

★ New Rip Fence (With Vernier Control)

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The Big Money-Saver for Home Shops and Carpenters

Time and work are worth money—and you'll save plenty of both with this new Atlas. It's fast and powerful—zips through cuts up to 2⅜" deep in a mere fraction of the time required for tiresome hand sawing. Big precision-ground table—22"x26¾" as shown—has 10⅝" surface ahead of blade to accommodate large stock.

You'll appreciate the sturdy new rip fence, too. Locks at both ends, unlocks instantly for positioning or removal, with vernier control for fine adjustment. 18"x22" and 35½"x22" table sizes also available. See this new Atlas 8" saw at your dealer's. Write for catalog.

FREE CATALOG

SEND A POSTCARD

ATLAS PRESS CO.

1252 N. Pitcher St., Kalamazoo, Michigan

MATCHED PRECISION TOOLS FOR WOODWORKING AND METALWORKING

Bring Down the House

[*Continued from page* 74]

their specimens of ore, and gold dust to determine its gold-bearing content. A few weeks after the wreckers began work, one of them commented during lunch:

"Lota dust in this place. Funny kind of copper-colored stuff. They didn't keep things any too clean here."

It didn't take the men long to learn that the "copper-colored stuff" was gold dust. Before they leveled the building, they had swept up a fortune!

Wreckers normally tear down a building in about five per cent of the time that it took to erect the structure. But there's never a blueprint for destruction as there is for construction. Every problem has to be met as it comes up, since no two buildings are alike.

First step is to strip the interior of furniture, linoleum, fixtures and plumbing. Then, starting on the ground floor and working up, holes are broken through each floor to permit wreckage to be dropped through to the basement.

Next, the men move to the roof, punch through a series of holes with sledge hammers. The wreckers then keep making these holes bigger until the entire top has crashed down into the basement.

Then the men work on the walls—with hammers and pickaxes, or with a special crane that batters a 3000-pound steel ball against the building. Sometimes a dynamite blast brings a heavy wall crashing down. When there's only an iron skeleton, the iron workers go into action with acetylene torches. All the time, the steam shovels are gulping huge mouthfuls of the debris piled high in the basement, and the trucks are taking away load after load.

Every day there are curious as well as dangerous adventures in the wrecking business.

And there's the luckless adventure of a wrecking crew in a New Jersey town not long ago. With the vim characteristic of the profession, the wreckers started pulling down a home according to their instructions. In the midst of the wrecking, a little man drove up, and sputtered:

"Hey, what are you doing? That's my house you're tearing down!"

The wreckers calmly continued their wrecking. The little man furiously sought out the foreman, who blandly told him he was only following orders. The foreman showed the irate owner an order slip for the wrecking job.

It was the correct street number, all right—*but the wrong street!* •

New SpeedWay COMBO KIT

$29.50

at your local hardware and electric stores.

Every home *needs* these basic tools!

Not only the home craftsman, model maker and mechanic, but everyone with a home, a car or a hobby needs a SpeedWay Combo Kit.

Here are the basic power tools needed wherever things are made, installed or repaired: No. 69 SpeedWay ¼" Drill, with attachments for sanding and polishing.

A No. 129 SpeedWay Hand Grinder, that takes all arbor-mounted grinding wheels, rotary files, cutters and brushes, and accessories as shown (left)

With this kit you can drill holes up to ¼" diameter, can grind, cut and shape steel, brass, wood, plastics, bone, etc. Tedious jobs like sand-papering, polishing and filing, scraping off rust, etc., actually become fun.

Designed and built by SpeedWay—manufacturers of quality power tools for over 40 years. These are not toys but capable electric tools with lots of power and correct operating speeds.

Sold by all leading hardware, electric, tool and department stores. (Ask for a demonstration.)

Write for FREE descriptive circular and the name of your nearest dealer.

Powerful 1/4" Capacity Electric Drill—drills holes in steel or wood. Quality drill bit included.

High-Speed Hand Grinder (20,000 R P M)—For all mounted cutting burrs (for cutting steel, wood, bone, plastics), grinding stones brushes and abrasive discs Seven assorted accessories plus 1/8" and 3/32" collets included

with adapter, rubber backer, and abrasive discs, it makes a portable power sander (Adapter backer and 10 assorted abrasive discs included.)

with the slip-on lamb's wool bonnet, it is a portable power-driven polisher or buffer.

Snapped in the chromium plated Speed Stand, it becomes a horizontal drill stand, bench sander or polishing head

Instruction Manuals—easy-to-follow guides to year 'round fun and useful pleasure with your Combo-Kit.

Note: The tools in the Combo-Kit operate on either 110-120 V AC or DC current

Speedway Manufacturing Co.
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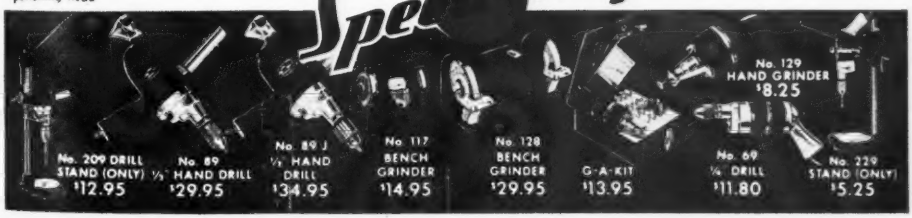
CICERO, ILLINOIS

SpeedWay "Blue Line Tools"



MI Tests The Kaiser-Frazer Cars

[*Continued from page* 88]

first night out I drove it just over 500 miles. The so-called super tires gave me trouble until I put 30 pounds in the front, instead of the recommended 24. This made steering easier and riding smoother.

The real test came when I found myself running through a record heat wave in Wisconsin. With the temperature well over 100, I drove from Milwaukee up the peninsula and back at speeds close to 80 mph. This was a test under unusual conditions and if the new Kaiser had any bugs they would have come out then. At no time during the run did the engine temperature go above 180 degrees F. and never was there any indication of a heat ping or lag. When I returned to Willow Run some days later, I had gone nearly 1500 miles.

The Kaiser proved to be a top-flight road car; it will cruise hour after hour with the best on the road when equipped with overdrive. The visibility is superb—sloped and rounded hood makes it possible to see the road within a couple of feet of the car. The angle and design of the windshield seem to hold oncoming headlight glare to a minimum, making the car perfect for night driving.

Comfort is a strong feature. The seats are wide and well pitched and the interior excellent in finish, fabric and color.

The only engine performance fault I detected was quite a bit of torque agony at low speeds in high. The car I was driving was equipped with everything from undercoating to full leather upholstery. This weight makes itself felt if you crack the throttle wide at exceptionally low speeds. However, as soon as you build up a few rpm she levels out.

The 1949 engine, with an added 12 hp, makes this year's models faster than last year's. It has a top speed between 86 and 89 mph (no relation to speedometer readings). You can cruise it all day long at over 70.

An odd thing to get used to when first driving these cars is the lack of ornaments on hood and fender. On most cars, some sort of radiator design serves as a sight for steering the car and keeping it on a straight line. In the Kaiser and Frazer, the hood and fenders are denuded of any decoration, leaving little to sight with. I admit this is a peculiar criticism but until you have driven the car awhile you're not really certain of its exact center.

[*Continued on page* 138]

Harvey E. Whitman
Jackson, Mich.
Senior 1st Award
$4,000 Scholarship

Howard Eichen
San Francisco, Calif.
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$3,000 Scholarship

Leon Levand
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Major Award Winners 1948 Competition

BOYS! $65,000 IN AWARDS

Build model cars for the 1949 Fisher Body Craftsman's Guild Competition—734 awards—university scholarships worth up to $4,000 each—cash—trips—tool chests!

Paul E. Jaquith, II
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Junior 3rd Award
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$1,000 Scholarship

Any boy 12 years old or over and not yet 20 on September 1, 1948, may enter the competition to design and build a model car. Junior and Senior Divisions with identical awards let you compete with boys of your own age. No dues or entrance fees. Awards include Model Builders' Tool Chests, cash, all-expense trips to the Guild Convention, and 8 university scholarships worth $1,000 to $4,000 each. (Duplicate awards are given if sons of General Motors employes win.) Judges include deans or presidents of 10 leading technical schools and universities.

Write for free membership. Each new member receives a membership card and button, a full set of plans and instructions, *all free*. Competition closes at midnight, July 1, 1949. *You* can win one of these awards! Mail the coupon NOW and get started.

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Gentlemen: Enroll me in the Fisher Body Craftsman's Guild 1949 Model Car Competition. Send me full instructions without charge.

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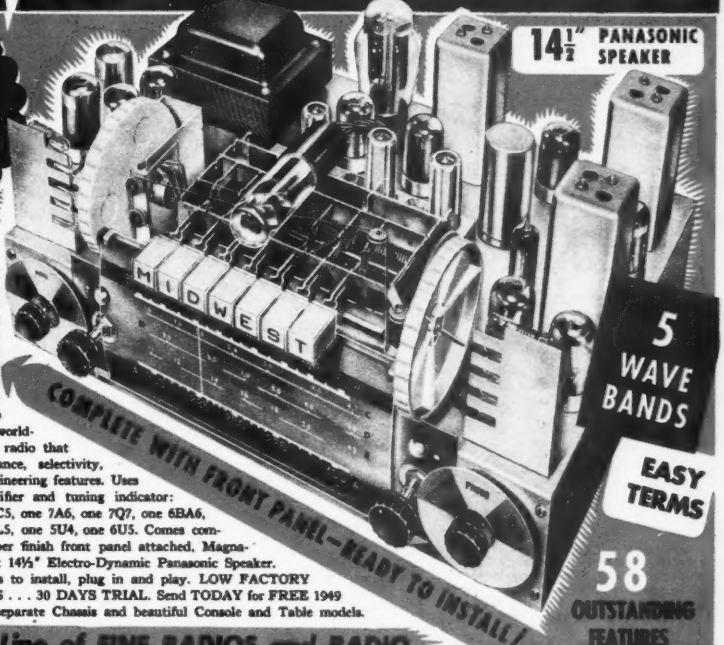
NEW SERIES 16 SUPER DE LUXE AM-FM CHASSIS

30 DAYS TRIAL



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5 WAVE BANDS

EASY TERMS

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TELEVISION Audio Switch-Over

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TRI-MAGNADYNE Coil System

...Plus NO-DRIFT FM and many other features

Here is the last word in radio engineering . . . a powerful, world-ranging, magnificently-toned radio that is unsurpassed for performance, selectivity, sensitivity, and advanced engineering features. Uses these latest-type tubes, rectifier and tuning indicator: three 7A7, three 7A4, two 7C5, one 7A6, one 7Q7, one 6BA6, one 6BE6, one 6C4, one 6AL5, one 5U4, one 6U5. Comes complete with satin stripe copper finish front panel attached, Magna-Tenna Loop Aerial and giant 14½" Electro-Dynamic Panasonic Speaker. Requires only a few minutes to install, plug in and play. LOW FACTORY PRICES . . . EASY TERMS . . . 30 DAYS TRIAL. Send TODAY for FREE 1949 Midwest Radio Catalog of separate Chassis and beautiful Console and Table models.

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Kaiser-Frazer Cars

[*Continued from page* 136]

One thing I would like to stress: these cars are definitely not substitutes, filling in a gap until there are plenty of the major manufacturers' cars to go around. Frankly, they are far superior to some of the offerings of the Big Three. I was so surprised with the way the Kaiser took my test run that I did some outside investigating on my own.

On the way home, I stopped two emergency trucks on the Pennsylvania turnpike. The men told me that no car gives them less trouble than the Kaisers and Frazers. This was a real stamp of approval. At several service stations along the same route the managers told me the same story—very little Kaiser or Frazer trouble. Later, I visited a large body shop which specializes in repairing wrecks of all kinds. Here they told me that Kaisers and Frazers use top grade steel and can really take a smashup with any car—and better than most. I was convinced!

So, the next time you hear somebody whispering about the lemons being turned out by the Willow Run plant, ask for some solid proof. The chances are you won't get any because Kaiser and Frazer are putting out fine cars which can certainly hold their own in the competitive automobile market. Not only that—they'll probably make a lot of established cars now on the road eat dust. •

Telescope Maker's Page

[*Continued from page* 109]

see this nebula with the naked eye, you really have excellent vision. It is a superb study in the telescope.

Note the two stars indicated by arrow No. 1. These are the "pointers" of the Big Dipper. These two stars always point to the North Star, arrow No. 6.

Arrow No. 5, in the constellation of the Big Dipper, points to the very interesting star called Mizar. Right next to it is a faint fourth magnitude star called Alcor. It is an interesting double star; one of the first to be discovered.

The constellation, Canis Major, contains the brightest star in all the heavens, Sirius, the "Dog Star." See arrow No. 4.

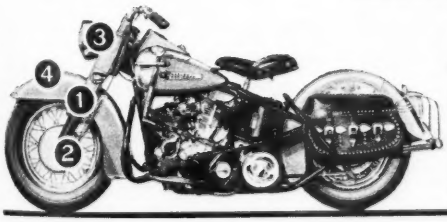
The planets, in their yearly journey across the heavens, always follow the dotted line shown in the lower center of the chart. This is known as the Ecliptic.

An interesting device for the novice astronomer is the *Barritt-Serviss Star and Planet Finder*. This is a circular chart which shows the position of the stars and planets at any hour of the day or night. •

HARLEY-DAVIDSON
with the New *HYDRA-GLIDE* FORK

1. *NEW* Hydra-Glide Fork irons out bumps like magic!
2. *NEW* powerful front brake takes hold at a touch!
3. *NEW* sealed ray headlight turns night into day!
4. *NEW* air flow fenders for streamlined beauty.

SMOOTH is the word for it . . . comfortably smooth, even on rough roads! Remarkably stable and easier than ever to handle. Takes off like a "jet-job" . . . amazing new performance! All this and more is yours in the New Harley-Davidson with the Hydra-Glide Fork. You'll ride with new road-hugging security, steer with new effortless ease, stop at a touch of the brakes, enjoy the great sport of motorcycling as never before! You'll enter a new world of motorcycling performance, as you thrill to the "flying-feel" of your Harley-Davidson wheeling you swiftly, securely and comfortably to exciting race meets, hillclimbs, endurance runs, sightseeing tours and faraway places. See your Harley-Davidson dealer today. Take a ride. Mail coupon now.



Harley-Davidson Motor Co.,
Dept. M1, Milwaukee 1, Wis.

Send literature on 1949 models, also free copy of ENTHUSIAST Magazine filled with motorcycle action pictures and stories.

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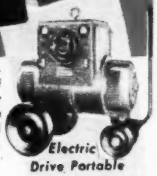
Make BIG MONEY Arc Welding!

Think how you can increase your income by doing an unlimited variety of welding jobs in the shop, in the field, or anywhere. With this gas engine drive unit, you weld, operate lights, run small tools and do hundreds of big-profit jobs, independent of power lines.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Use arc welding to build a profitable business of your own. Be sure of success with a Hobart made to fit your plans. There's a size and type to fit every welding need.

A.C. (alternating current) transformer welder

Ideal for shop work. Lets you do repair work and fabricate metal products that sell at a profit. Easy to operate, makes better welds. Highly efficient. Made in 180 to 500 ampere sizes.

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NAME _____

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How to Be a Millionaire

[*Continued from page* 64]

Elastic-top hose is a step in this direction, but not a very long one. Washing loosens the elastic. Then the socks droop like wet wash on a broken laundry line. Many men suffer from varicose veins and can't stand tight garters binding their legs. They're a big sales market for some inventor who doesn't mind making a lot of money with a new wrinkle.

Invention of the typewriter hit the jackpot but refinements on that original invention have put lots of idea men in the chips. The noiseless machine, touch tuning for heavy and light typists, the bell that jingles at the end of the line. . . . But why hasn't someone invented a gadget that will warn a typist when she comes to the end of the page? Think up a gadget like that and the typewriter makers will mention you in their prayers.

Watch the little woman's face the next time she takes off her metal curlers. She screws up her face each time she removes a curler. That's because it catches the ends of the hair and pulls out a few strands when she takes off the curler. Cloth curlers have been devised to avoid this unpleasant feature. Trouble is, they don't curl as well as the metal ones. Mint yourself a million or so, then, by inventing a metal curler that can grip milady's locks firmly but won't do any hair-pulling when the time comes for unfurling the curl.

Stores are stocked counter-deep with household gadgets, but where can you find a potato peeler that's really good? Peelers are invented by the dozen. Yet the market is wide open for one that actually does the trick without shaving away most of the spud.

The nation's big companies are seeking many, many more gadgets. Electrical firms are looking for someone who can invent an unbreakable light bulb—or at least a bulb that won't break quite so easily as the ones now manufactured. Cigaret companies are always in the market for a new type of package that you can open more easily. Distributors for resorts and recreation centers would go overboard for a slot machine that would flip out an ice-cream cone when you flipped in a coin.

The Armed Forces, too, are looking for ideas that any inventive guy might turn up. The National Inventors Council, U. S. Department of Commerce, lists several hundred problems that the services hope inventors will solve. Some of the inventions needed are:

1. A bolt that will work with little turning.
2. A telescoping screw for elevating mechanisms.

[*Continued on page* 142]

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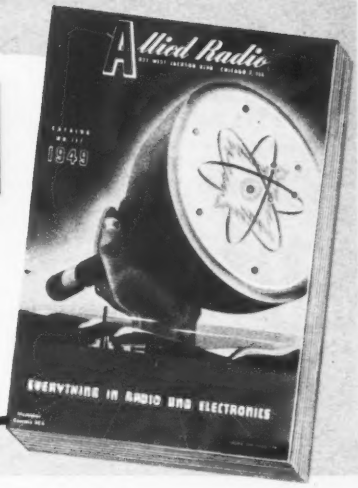

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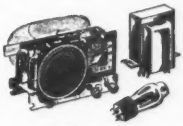

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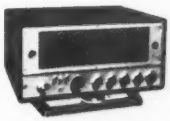

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How to Be a Millionaire

[*Continued from page* 140]

3. A hydraulic jack that will not leak off under load or bind while lowering the load.
4. Storage batteries for the Polar regions.
5. A smoke-producing mixture that will ignite and burn on wet ground.
6. A substitute for the pneumatic tire.
7. A new, nonmagnetic compass.
8. Vehicle handwheels that won't chill the operator's hands in cold weather.
9. A nondetectable ground mine.
10. An airbrake setup with only one hose.

These are only a few of the thousands of inventions needed today in national defense, in business and in the home. Here are new fields for the modern young inventor to conquer. The world needs men who understand how a cyclotron works, who can put more power in planes and autos or who can find cures for dread diseases. But the world also needs men who can think up simple gadgets.

The man who put the first rubber eraser on pencils didn't have to be an Einstein on relativity or an Oppenheimer on the atom to do a lot for civilization. Even if you can't get too excited about civilization at the moment, remember—a little idea can make you a millionaire—and quicker than you can spend your paycheck! •

I Jazz Up Old Pianos

[*Continued from page* 87]

with tools and having mechanical aptitude can learn to do the work in a short time.

Begin in a small way and let your growth be financed out of profits. You can get off to a good start with a $300 investment in your shop. This sum will buy your essential equipment—a good set of carpenter's tools, an eight-inch table saw, a workbench, cutting tables and the required materials for upholstering your first three or four pianos.

Your average gross profit per upholstered piano should be $150. Your net profit—after material cost and operational overhead should be about $90. Most of your headaches, like mine, will be your own fault.

I recall the time I delivered a red piano to Mrs. Jones when she had ordered a soft, subdued grey. Then there was the tragic day I inscribed "Mary" in nailheads on "Jean's" piano!

Is it profitable? I'm doing OK. I grossed $20,000 the very first year I was in business for a net take of $10,000!

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THOUGHTS HAVE WINGS

You Can Influence Others With Your Thinking!

TRY IT SOME TIME. Concentrate intently upon another person seated in a room with you, without his noticing it. Observe him gradually become restless and finally turn and look in your direction. Simple—yet it is a *positive demonstration* that thought generates a mental energy which can be projected from your mind to the consciousness of another. Do you realize how much of your success and happiness in life depend upon your influencing others? Is it not important to you to have others understand your point of view—to be receptive to your proposals?

Demonstrable Facts

How many times have you wished there were some way you could impress another favorably—*get across to him or her your ideas?* That thoughts can be transmitted, received, and understood by others is now scientifically demonstrable. The tales of miraculous accomplishments of mind by the ancients are now known to be fact—not fable. The method whereby these things can be *intentionally*, not accidentally, accomplished has been a secret long cherished by the Rosicrucians—one of the schools of ancient wisdom existing throughout the world. To thousands everywhere, for centuries, the Rosicrucians have privately taught this nearly-lost art of the practical use of mind power.

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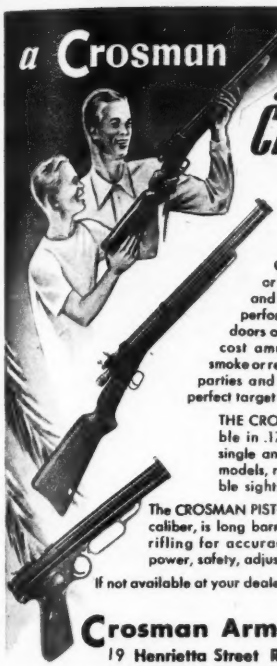

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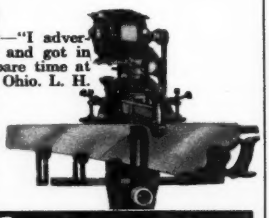

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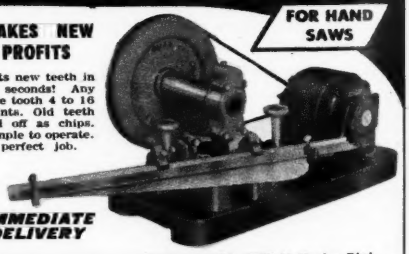

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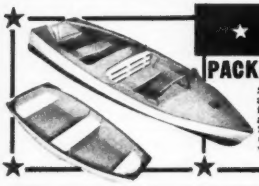

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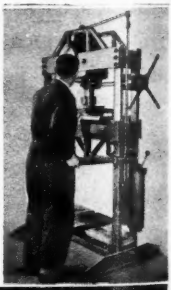

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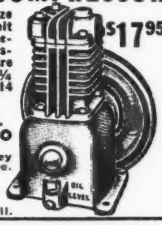

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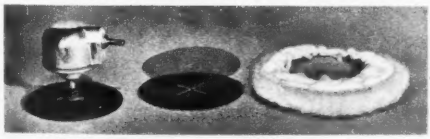

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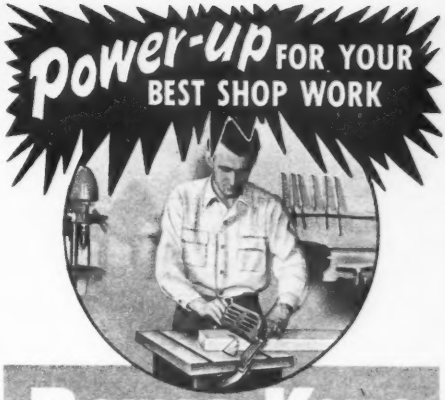

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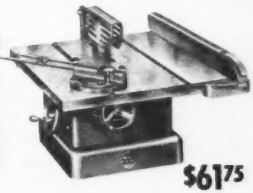

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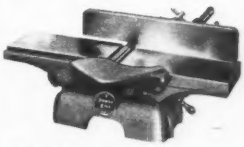

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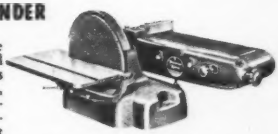

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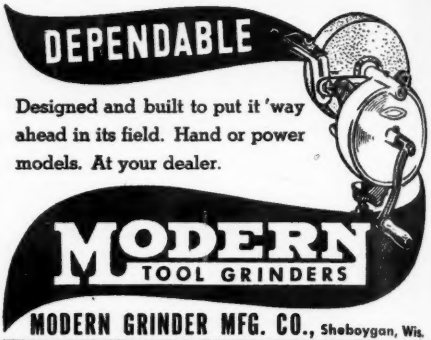

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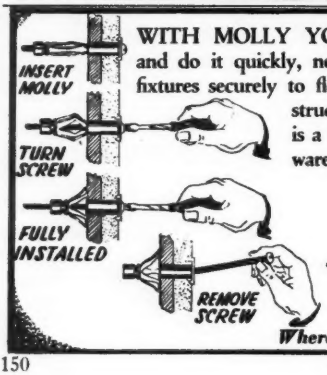

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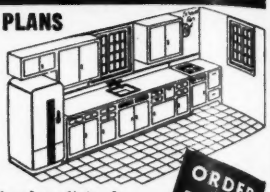

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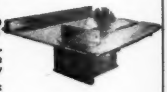

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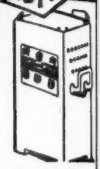

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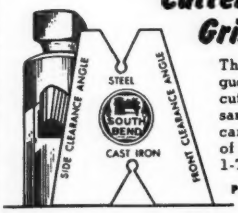

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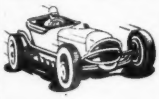

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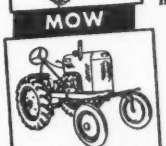

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REFRIGERATION GRADUATES: booklet helps you earn more money. Send for free details. Refrigeration Advisory Service, Dept. X, 3155 Chippewa St., St. Louis 18, Mo.

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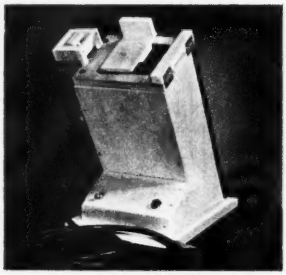

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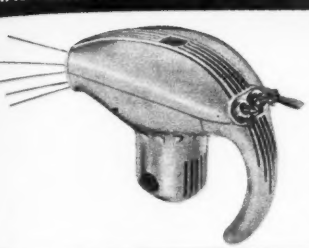

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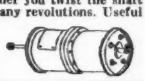

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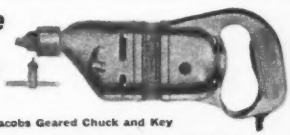

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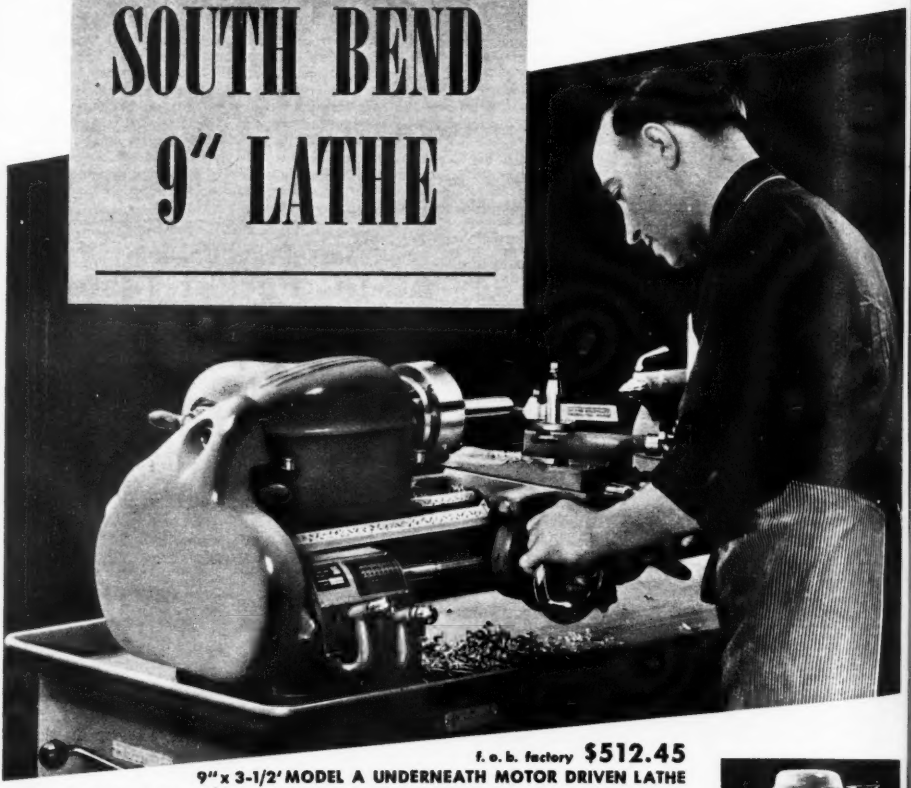

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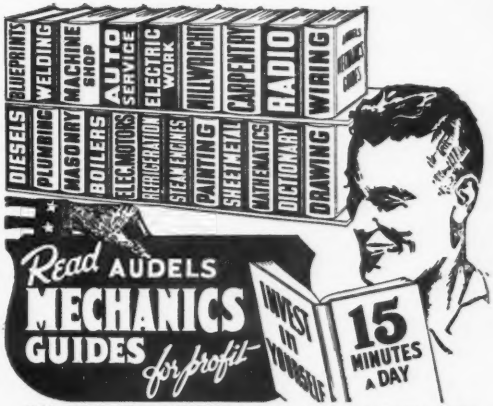

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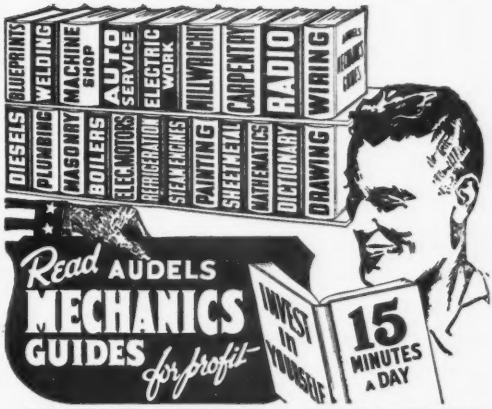

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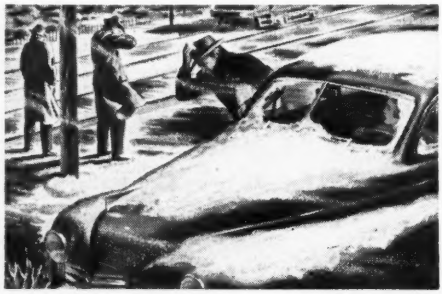

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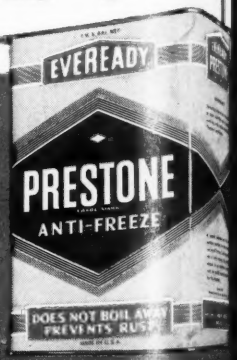

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